Pivotality and responsibility attribution in sequential voting

Bartling, Björn ; Fischbacher, Urs ; Schudy, Simeon

Abstract: This paper analyzes responsibility attributions for outcomes of collective decision making processes. In particular, we ask if decision makers are blamed for being pivotal if they implement an unpopular outcome in a sequential voting process. We conduct an experimental voting game in which decision makers vote about the allocation of money between themselves and recipients without voting rights. We measure responsibility attributions for voting decisions by eliciting the monetary punishment that recipients assign to individual decision makers. We find that pivotal decision makers are punished significantly more for an unpopular voting outcome than non-pivotal decision makers. Our data also suggest that some voters avoid being pivotal by voting strategically in order to delegate the pivotal vote to subsequent decision makers.

DOI: https://doi.org/10.1016/j.jpubeco.2015.03.010

Originally published at:
Bartling, Björn; Fischbacher, Urs; Schudy, Simeon (2015). Pivotality and responsibility attribution in sequential voting. Journal of Public Economics, 128:133-139.
DOI: https://doi.org/10.1016/j.jpubeco.2015.03.010

Pivotality and Responsibility Attribution in Sequential Voting*

Björn Bartling† Urs Fischbacher‡ Simeon Schudy§

April 17, 2015

Journal of Public Economics, forthcoming

Abstract

This paper analyzes responsibility attributions for outcomes of collective decision making processes. In particular, we ask if decision makers are blamed for being pivotal if they implement an unpopular outcome in a sequential voting process. We conduct an experimental voting game in which decision makers vote about the allocation of money between themselves and recipients without voting rights. We measure responsibility attributions for voting decisions by eliciting the monetary punishment that recipients assign to individual decision makers. We find that pivotal decision makers are punished significantly more for an unpopular voting outcome than non-pivotal decision makers. Our data also suggest that some voters avoid being pivotal by voting strategically in order to delegate the pivotal vote to subsequent decision makers.

Keywords: Collective decision making, responsibility attribution, voting, pivotality, delegation, experiment

JEL-Classification: C91, C92, D63, D71, D72

* We would like to thank the editor and two anonymous referees for very insightful and constructive suggestions. We would also like to thank Lisa Bruttel, Katharine Bendrick, Fadong Chen, Gerald Eisenkopf, Christina Fong, Konstantin Hesler, Katrin Schmelz, and Irenaeus Wolff as well as participants of the International ESA Meeting 2013 at the University of Zurich for helpful thoughts and comments.
† Department of Economics, University of Zurich, Blümlisalpstrasse 10, 8006 Zurich, Switzerland, e-mail: bjoern.bartling@econ.uzh.ch
‡ Department of Economics, University of Konstanz, Universitätsstrasse 10, 78457 Konstanz, Germany; Thurgau Institute of Economics, Hauptstrasse 90, 8280 Kreuzlingen, Switzerland, e-mail: Urs.Fischbacher@uni-konstanz.de
§ Department of Economics, University of Munich, Geschwister-Scholl-Platz 1, D-80539 Munich, Germany, e-mail: simeon.schudy@econ.lmu.de

"As soon as a majority has voted for it, it is declared passed, and the member who voted last is given credit for having passed it." – Shapley and Shubik[1]

1. Introduction

Many economic and political decisions are taken collectively. For example, boards commonly make decisions about business strategies in firms, committees of experts decide on interest rate policies in central banks, and coalition governments often enact laws in democratic countries. This paper analyzes how people affected by a collective decision, such as workers, shareholders, or electorates, attribute responsibly for the decision outcome to individual members of the collective decision making entity. Understanding responsibility attribution for collective decisions is of relevance because it can, for example, affect shareholders' willingness to extend a manager's contract or influence a political party's prospects of reelection.

Collective decisions are often reached by a vote among the decision makers and the voting process is often transparent. For example, the Bank of England's Monetary Policy Committee reveals its members' voting decisions and explicitly states that the "decision goes to the majority and there is no attempt to arrive at a consensus: members are individually accountable for their decisions" (see also Bank of England, 2005). The minutes of the U.S. Federal Reserve Open Market Committee are published as well (Levy, 2007).[2]

In this paper, we focus on analyzing responsibility attribution for outcomes of collective decisions reached by a transparent voting process. In particular, we ask if decision makers are blamed for being *pivotal* if they implement an unpopular outcome in a *sequential voting process*. This question is of interest also in light of the above

[1] Shapley and Shubik (1954), p. 788.

[2] Both the Monetary Policy Committee and the Federal Reserve Open Market Committee publish individual votes, and the latter also reveal the order of votes, namely: first chairman, than vice chairman, then the other members in alphabetical order (see also Gerlach-Kristen and Meade, 2011).

quotation from Shapley and Shubik (1954) who introduced the idea that the pivotal voter in a collective decision making process "is given credit," i.e., is held responsible for having passed the decision. Hence, our paper can also be seen as a test of their proposition.

We employ an incentivized laboratory experiment to address our research question. In the experiment, there are groups of six subjects. Three subjects have voting rights and decide sequentially and observably whether to implement an equal or an unequal allocation of money among themselves and the other three subjects, who have no voting rights. The equal allocation gives the same amount of money to all subjects, whereas the unequal allocation increases the monetary payoff of the subjects with voting rights at the expense of those without voting rights. A simple majority rule applies. After the vote, subjects without voting rights can assign costly punishment points to the voters. We interpret the assignment of punishment points as a measure of responsibility attribution.

Our main finding is that subjects attribute significantly more responsibility to the pivotal voter than to the other voters. The result holds even if we control for standard punishment motives such as outcome based fairness (e.g., Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000), unkind intentions (e.g., Rabin, 1993; Dufwenberg and Kirchsteiger, 2004), or the interaction of outcomes and intentions (Falk and Fischbacher, 2006). Our data further suggest that about one-fifth of those voters who reveal their preference for the unequal allocation when their vote as the last voter is decisive vote for the equal allocation if it is possible to "delegate" the pivotal vote to the subsequent voter.[3]

[3] A vote by the third voter is decisive if the first two voters fail to reach a majority.

Our study is closely related to recent experimental work in political science by Duch et al. (2015), who also examine responsibility attributions for collective decisions. They consider a setting that, like ours, is akin to a collective dictator game with punishment. Their design, however, is different in two important ways. First, they consider a simultaneous voting procedure, while we focus on sequential voting. Second, one decision maker has proposal power and decision makers have weighted votes in their design, while the voters in our design are symmetric (apart from the sequential order of voting). Duch et al.'s main finding is that the decision maker with proposal power and the one with the largest voting share incur the most punishment in case of an unequal allocation. The sequential voting procedure in our experiment renders the role of pivotality more salient. Our work thus complements Duch et al.'s findings by revealing the importance of the pivotal vote for responsibility attribution in collective decision making.

Our paper also contributes to the political science literature that does not focus on collective decision making in particular but on responsibility attribution in general. In this literature, the attribution of credit or blame has been related to the power of a decision maker (see e.g. Banzhaf, 1964; Penrose, 1946; Shapley and Shubik, 1954), the number of veto players (Tsebelis, 2011) and governing party size (see e.g. Anderson, 1995; Lewis-Beck, 1990), and to the extent to which unified control of policymaking by incumbent governments is possible (Powell and Whitten, 1993). Similarly, Finer (1975), Alesina (1997), Lijphart (2012, 12), and Franzese Jr (2002, 12) argue that coalition governments provide less potential for electoral accountability than single party governments, and Duch and Stevenson (2008, author-year) report that voters are more likely to attribute economic outcomes to single-party majority cabinets than to coalition governments.

Finally, the results of our study contribute to the economics literature on the importance of pivotality in markets and organizations (see e.g. Falk and Szech, 2013), as well as to the literature on delegation of unpopular decisions (e.g., Hamman et al. 2010, Coffman 2011, Bartling and Fischbacher, 2012). Falk and Szech (2013) analyze how the decision maker's perception of her own pivotality affects the likelihood of taking an immoral decision (the decision to kill a mouse) in a trading environment. They find that the likelihood of killing the mouse is higher if a decision maker's perception of being pivotal is lower and that on the aggregate level, many more mice are killed in a treatment where pivotality is diffused. Our study shows that not only the perception of the pivotality of the own decision matters for choice. We show that more responsibility and blame is attributed to pivotal than to non-pivotal decision makers, which in turn can affect the decision makers' choices. Bartling and Fischbacher (2012) demonstrate that it is possible to shift the blame for an unpopular decision by delegating the choice to another person, and that many people do so. The main result of our current paper shows that it is also possible in the context of collective decision making to shift some blame by "delegating" the pivotal vote, and the data suggest that some voters make use of that option.

The remainder of our paper is organized as follows. Section 2 explains the experimental design and procedures. We discuss the punishment predictions of standard social preference models in economics, as well as the role of pivotality for punishment in Section 3. Section 4 reports our experimental results. Section 5 concludes.

2. Experimental Design

We implemented a sequential voting game with punishment. Three "voters" and three "receivers" form a group. The voters decide on the allocation of a total of 30 points among the six group members, using a simple majority rule. There are two possible allocations. The unequal allocation gives 9 points to each of the voters and only 1 point to each of the receivers (9,9,9;1,1,1). The equal allocation distributes the 30 points evenly among the six group members (5,5,5;5,5,5). Importantly, the voters cast their votes sequentially. The other voters and receivers of the group are able to observe both the sequence of the decisions and the decisions themselves. First, Voter 1 votes for one of the two allocations. Then Voter 2 observes Voter 1's action and votes herself. Finally, Voter 3 casts her vote, knowing the choices of Voters 1 and 2. Abstentions are not possible. Figure 1 illustrates the decision tree.

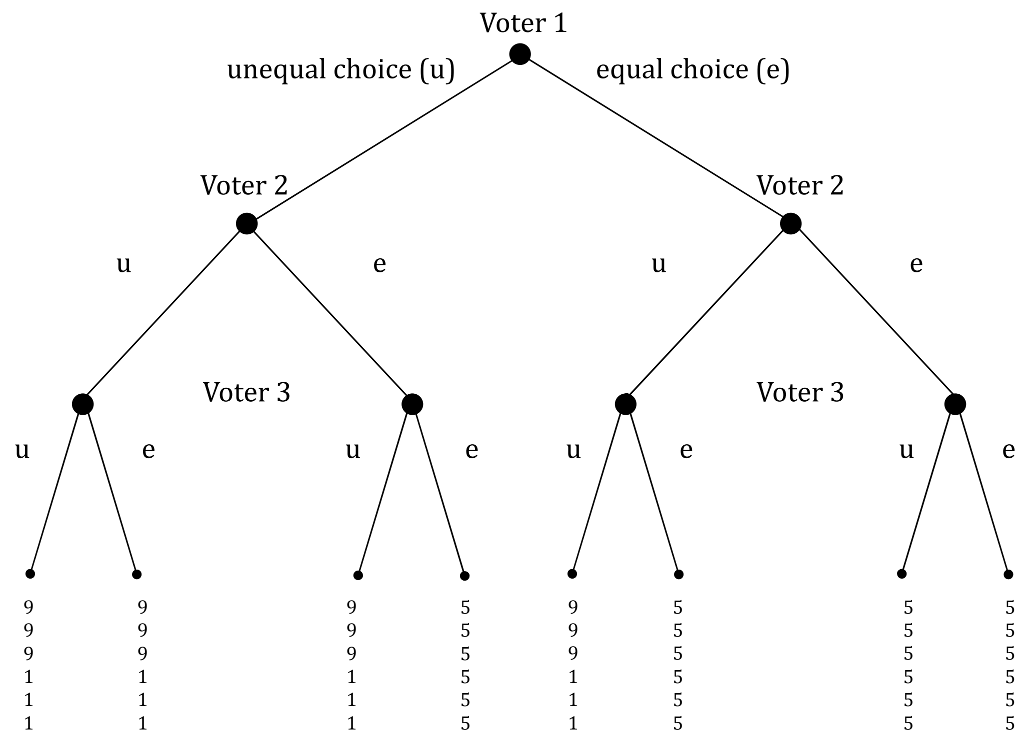


Figure 1: Voters' Choices and Resulting Allocations for Voters and Receivers

The three receivers first observe the sequence of the votes and thus also the voting outcome. One randomly selected receiver then has the option to punish individual voters by deducting points. Punishing is costly for the receivers. A receiver incurs a fixed cost of one point to be able to deduct up to seven points from the voters. The seven punishment points can be assigned to a single voter or they can be distributed among two or all three voters, but it is not possible to reduce a voter's payoff below zero.

The players' payoff functions are summarized as follows. A voter either receives nine or five points, depending on the chosen allocation; furthermore, he might incur punishment points from the randomly chosen receiver. The randomly chosen receiver gets either one or five points, depending on the chosen allocation, minus the cost of punishment (one point) if she deducts at least one point from the voters. The two other receivers get a payoff of either five or one point, depending on the chosen allocation.

The game was played one-shot and we used the strategy method for both receivers and voters. Each receiver decided, in a randomized order, for each of the eight possible voting histories (see the eight end-nodes in Figure 1) how to punish the individual voters. Only after the receivers made all eight decisions, each receiver learned whether or not she was the randomly selected receiver who could punish, and she knew that her punishment decisions for the realized situation were binding.[4] Voters decided at seven decision nodes, namely as first as Voter 1, then as Voter 2, and finally as Voter 3. In the role of Voters 2 and 3, subjects make decisions for every possible pre-play history (see the seven decision nodes in Figure 1). The respective pre-play histories were shown in a randomized order. Voters knew that their choices were binding and that they would

[4] Brandts and Charness (2011, author-year) provide a survey of the effect of the use of the strategy method on punishment decisions in experiments and find no case were a treatment effect that is detected using the strategy method vanishes when the direct response method is used. The use of the strategy method can thus be considered as the more conservative test in our context.

learn their randomly assigned role as Voter 1, Voter 2, or Voter 3 only after they decided on all seven decision nodes.[5]

2.1 General Procedures

Before the subjects entered the lab, they randomly drew a place card that specified at which computer terminal to sit. The terminal number determined both a subject's role (voter or receiver) and the group matching. After entering the lab, subjects received paper copies of the instructions explaining the game at their assigned terminals. The subjects' instructions included comprehension questions that had to be answered correctly before a session began. We used a neutral framing for voters and receivers (Players A and B), as well as for punishment (deduction points), and for the labeling of the two allocations (Allocations 1 and 2). An experimenter read a summary of the instructions aloud to ensure common knowledge about the game. An English translation of the original German instructions can be found in the Online Appendix.

The data were collected in four sessions in two consecutive weeks in November and December 2012. 144 subjects participated in total. Each subject participated only once. The sessions took place at the decision laboratory of the Department of Economics at the University of Zurich. Participants were students from the University of Zurich and the Swiss Federal Institute of Technology in Zurich. The experiment was conducted using z-Tree (Fischbacher, 2007), and we used ORSEE (Greiner, 2004) for recruiting.

The experiment took about 75 minutes. Each experimental point was converted to CHF 3.00 at the end of the experiment. The subjects earned about CHF 26.30 (about $28

[5] Although we used the strategy method, we made the sequential voting procedure very clear. For each of the possible situations, each voting decision was reflected by an individual update of the computer screen. For example, the third voter was informed about the preceding voters' decisions in the sequential order and had to confirm the receipt of each piece of information by clicking a button. Equivalently, a receiver had to click through a sequence of screens showing the sequential order of the three voters' decisions (i.e., the path through the game tree) before making her punishment decision for a given voting outcome. See the experimental instructions in the Online Appendix for more details.

at the time of the experiment), which included a show-up fee of CHF 12. Earnings were paid privately to ensure the anonymity of the decisions.

3. Punishment Motives

If all subjects are purely self-interested, the receivers will not incur the cost of punishment, irrespective of the resulting allocation and the voting sequence. It is well known, however, that the pure self-interest model does not always accurately predict many subjects' behavior. In this section, we discuss punishment motives based on the most widely used economic theories of social preferences. We include punishment predictions of social preference models based on outcomes (e.g. Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000), intentions (Rabin, 1993; Dufwenberg and Kirchsteiger, 2004), and the interaction of outcomes and intentions (Falk and Fischbacher, 2006). In addition, we consider "choice" (i.e., vote) as one particular punishment motive because it strikes us as a natural heuristic to assign punishment in our context. Finally—being the focus of this paper—we discuss the potential punishment motive "pivotality."[6]

3.1. Outcome-based models of social preferences

Outcome based models of social preferences, e.g., Fehr and Schmidt (1999) or Bolton and Ockenfels (2000), assume that some people dislike unequal allocations. Inequity-averse receivers might thus be willing to incur the cost of punishment to reduce payoff differences. This model class predicts no punishment if the equal allocation prevails but

[6] The predictions of the formal economic models relate to predictions by concepts included in psychological attribution theories, such as the concept of "controllability" (Weiner, 1979), i.e., the extent to which a person was in control of causing a particular outcome. In the Online Appendix, we provide three conceptualizations of Weiner's idea of controllability and analyze the extent to which these conceptualizations explain the punishment decisions observed in our data. In line with the concept of controllability, we find higher punishment if an unfair action is chosen in a situation with higher control. We thank an anonymous referee for suggesting this analysis.

predicts positive punishment otherwise. Importantly, the predicted punishment neither depends on individual choices (votes) nor on the sequence of voting.

3.2. Choice of the unequal allocation

Voting for the unequal allocation could be perceived as a stated preference for the unequal allocation and thus as blameworthy. This would predict no punishment for a voter who opted for the equal allocation but some punishment for a voter who opted for the unequal allocation (even if this voter can no longer influence the outcome). The punishment motive "unequal choice" can be seen as a naïve version of the punishment motive "intentionality," which we discuss next.

3.3. Intention-based models of social preferences

Intention-based models of social preferences, e.g., Rabin (1993) or Dufwenberg and Kirchsteiger (2004), assume that people are willing to incur costs to punish unkind actions, irrespective of the resulting allocation. In these models, the unkindness of an action is measured by comparing the chosen action with the possible alternative actions. In our game, voting for the unequal allocation is an intentionally unkind action if a voter is still able to affect the outcome of the voting process. If Voters 1 and 2 already decided the vote, Voter 3's vote is irrelevant and therefore classified as a neutral action, i.e., as neither kind nor unkind. Voting for the equal allocation, while still being able to affect the outcome, is a kind action. The notion of intention-based reciprocity predicts no punishment for neutral or kind voters.

3.4. Outcome and intention

Falk and Fischbacher (2006) combine the punishment motives "outcome" and "intention." In their model, people are willing to punish decision makers who implement unequal allocations, and punishment is even stronger if the decision maker's action is intentional. In our context, punishment for a voter is thus predicted only if both the unequal allocation results and the voter's intention is unkind.

3.5. Pivotality

The central hypothesis in our paper is that being pivotal is regarded as carrying special responsibility for the resulting voting outcome. Therefore, the prediction of the notion of pivotality is that the pivotal voter will be punished more than the other voters, given the unequal outcome results.

4. Results

4.1. Pivotality and Punishment

Our main research question is whether receivers blame the pivotal voter more than the non-pivotal voters if the unequal allocation is chosen. We investigate this question using the punishment pattern as a measure of the assignment of blame. Table 1 shows the average punishment levels for the first, second, and third voter separately for each of the eight possible voting outcomes. The table shows that average punishment is higher for the pivotal voter (shown in boldface) than for the non-pivotal voters in all four voting sequences in which the unequal allocation results. For example, the first row of Table 1 shows the voting sequence "u-u-u," in which all voters opted for the unequal allocation. Voter 2 is the pivotal voter and she is punished by 1.85 points on average. Voter 1, the first intentionally unkind voter, is punished by 1.5 points and Voter 3, whose vote could not make a difference, is punished by 0.86 points on average. The two rightmost columns in Table 1 show the significance levels for the comparisons between the punishment for the pivotal voter and the non-pivotal voters, either taking the average of both other voters as the comparison group ("all voters") or the other intentionally unkind voter only ("unkind voter"). The table shows that the difference in punishment between the pivotal and the average of the two non-pivotal players is significant in all four voting sequences. While average punishment for the pivotal voter is higher than for the non-pivotal unkind voter in all four voting sequences, the differences in average punishment between the pivotal voter and the intentionally unkind voter are significant only in the two situations in which the pivotal voter is the last voter.[7]

Table 1: Average punishment in the eight possible voting sequences

		Average punishment			Pivotal vs. Non-Pivotal	
Allocation	Voting Sequence	Voter 1	Voter 2	Voter 3	all voters	unkind voter
unequal	u-u-u	1.5	**1.85**	0.86	p<0.001	p=0.294
	u-u-e	1.86	**1.92**	0.26	p<0.001	p=0.960
	u-e-u	1.68	0.07	**2.39**	p<0.001	p=0.006
	e-u-u	0.11	1.83	**2.33**	p<0.001	p=0.012
equal	u-e-e	1.33	0.10	0.08	-	-
	e-u-e	0.17	1.43	0.08	-	-
	e-e-u	0.06	0.03	0.92	-	-
	e-e-e	0.08	0.07	0.03	-	-

Notes: "u" denotes a vote for the unequal allocation; "e" denotes a vote for the equal allocation. The punishment for the pivotal voter is written in boldface. The two rightmost columns show p-values of Wilcoxon signed rank tests comparing the punishment for the pivotal voter to the punishment for the two other voters ("all voters") and to the punishment for the other intentionally unkind voter only ("unkind voter").

In Figure 2, we show the average punishment for all voters when the unequal outcome occurred. We aggregate punishment based on whether a voter's choice was unequal ("Choice unequal"), whether a voter was revealed to be intentionally unkind, i.e., the voter opts for the unequal outcome while the voting outcome is still open ("Intention unkind"), or whether the voter was pivotal, i.e., completed the minimum winning coalition necessary to implement the unequal outcome ("Pivotal"). Note that a voter's intention can only be unkind if her choice is unequal, and a voter can only be

[7] Throughout the paper, we only consider being pivotal *for the unequal allocation* and thus neglect the fact that the second voter who opts for the equal allocation after the first voter opted for the equal allocation is pivotal *for the equal allocation*. Little punishment occurs in case of the equal allocation, and we do not find that voters who are pivotal for the equal allocation are again punished significantly less than the other voters.

pivotal for the unequal allocation if she is intentionally unkind. We thus have four categories of voters, as shown in Figure 2.

(1): Voters who did not choose the unequal allocation

(2): Voters who chose the unequal allocation but could no longer affect the outcome

(3): Voters who chose the unequal allocation when they could still affect the outcome, so that their action is intentionally unkind, but who were not pivotal

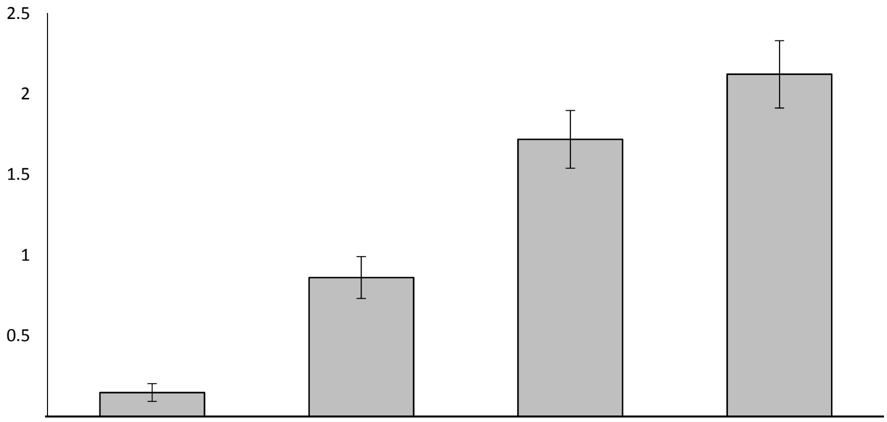
(4): Voters who chose the unequal allocation when they could still affect the outcome and who were pivotal.

Table 2 summarizes how the voters are placed into these four categories in the four different voting sequences that result in the unequal outcome.

Table 2: Voting sequences and placement of voters into categories in Figure 2

Voting Sequence	Voter 1	Voter 2	Voter 3
u-u-u	(3)	(4)	(2)
u-u-e	(3)	(4)	(1)
u-e-u	(3)	(1)	(4)
e-u-u	(1)	(3)	(4)

Notes: The table shows which voters are placed into the four categories (1)-(4) shown in Figure 2 for the different voting sequences that result in the unequal allocation. For example, the top row shows the voting sequence in which all voters voted for the unequal allocation (u-u-u). Voter 1 chose the unequal allocation, could still affect the outcome so that the unequal choice is intentionally unkind, but was not pivotal. Voter 1 thus falls into category (3) in Figure 2. Voter 2 chose the unequal allocation, was intentionally unkind and pivotal. Voter 2 thus falls into category (4). Voter 3 chose the unequal allocation but could no longer affect the outcome, so she was neither intentionally unkind nor pivotal. Voter 3 thus falls into category (2).



	(1)	(2)	(3)	(4)
Choice unequal :	no	yes	yes	yes
Intention unkind:	no	no	yes	yes
Pivotal:	no	no	no	yes

Figure 2: Average punishment for voters if the unequal allocation results. The bars show the average punishment for (1) voters who voted for the equal allocation, (2) voters who voted for the unequal allocation but could not affect the outcome as it was decided already, (3) non-pivotal voters who intentionally voted for the unequal allocation, and (4) pivotal voters. The error bars show standard errors of the means.

Figure 2 shows that average punishment is lowest for the voters who vote for the equal allocation. It amounts to 0.15 points and is highly significantly different from the other three groups (Wilcoxon signed rank tests based on average punishment per subject, N= 72, p-values<0.001). The voters who chose the unequal allocation but could no longer affect the outcome (because Voters 1 and 2 opted for the unequal allocation already) were punished by 0.86 points on average, which is also highly significantly different from the other groups (Wilcoxon signed rank tests based on average punishment per subject, N= 72, p-values<0.001). Finally, non-pivotal but intentionally unkind voters are punished on average by 1.72 points, while pivotal voters are punished by 2.12 points on average. This difference, as well, is statistically significant (Wilcoxon signed rank test based on average punishment per subject, N= 72, p=0.032). We summarize our findings in the following:

Result 1 (Pivotality and Punishment): *On average, the pivotal voter is punished the most.*

4.2. An Econometric Comparison of Different Punishment Motives

In this subsection, we provide an econometric comparison of the punishment motives that we discussed in Section 3. We first compare the explanatory power of the different motives in isolation. Then, we consider all motives simultaneously to analyze if pivotality has explanatory power on top of the other punishment motives.

We show the results of the econometric analysis in Table 3. Note that all decisions are always included in this analysis, including the decision resulting in the equal outcome. Regression (1) shows that the punishment for voters is significantly higher if the unequal allocation results (average punishment of 1.389 points) compared to if the equal allocation results (average punishment of 0.365 points). Regression (2) shows that those voters who vote for the unequal allocation are punished significantly more (average punishment of 1.659 points) than those voters who vote for the equal allocation (average punishment of 0.095 points). Regression (3) reveals that a voter with an unkind intention is punished significantly more (average punishment of 1.812 points) than a voter with a neutral or kind intention (average punishment of 0.208 points). Regression (4) shows that the punishment for intentionally unkind voters whose votes contributed to the final implementation of the unequal allocation (average punishment of 1.920 points) is significantly higher compared to all other voters (average punishment of 0.355 points). Finally, regression (5) shows that punishment for voters who are pivotal for the unequal allocation (average punishment of 2.122 points) is significantly higher than the punishment for all other voters (0.628 points).

Table 3: An econometric comparison of different punishment motives

OLS	(1)	(2)	(3)	(4)	(5)	(6)
Outcome unequal	1.024***					0.048
	(0.126)					(0.070)
Choice unequal		1.564***				0.782***
		(0.154)				(0.137)
Intention unkind			1.604***			0.517**
			(0.161)			(0.196)
Outcome unequal				1.565***		0.289
x Intention unkind				(0.169)		(0.232)
Pivotal					1.494***	0.403**
					(0.180)	(0.155)
Constant	0.365***	0.095***	0.208***	0.355***	0.628***	0.083**
	(0.067)	(0.033)	(0.041)	(0.055)	(0.065)	(0.037)
Observations	1,728	1,728	1,728	1,728	1,728	1,728
R^2	0.105	0.244	0.250	0.217	0.124	0.281

Notes: The dependent variable is punishment points for voters. *Outcome unequal* is a dummy variable which equals 1 if the unequal allocation is chosen. *Choice unequal* is a dummy variable which equals 1 if a voter opts for the unequal allocation. *Intention unkind* is a dummy variable which equals 1 if a voter opts for the unequal allocation and no majority was reached before her vote. *Pivotal* is a dummy variable which equals 1 if a voter is pivotal for the unequal allocation. Standard errors, clustered on 72 individuals, are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

The main insight provided by the regression analysis in Table 3 is that all five punishment motives that we discussed in Section 3 make the qualitatively correct comparative-static prediction with respect to average punishment levels. To compare the explanatory power of the different motives, we can directly compare the R^2 in models 1 to 5. This is meaningful because all of the models have just one parameter. We find that the predictive power of the punishment motive "pivotal" (R^2=0.124 in model 5) is higher than the predictive power of the motive "outcome unequal" (R^2=0.105 in model 1). But the predictive power of the motives that take "choice" or "intention" into account is higher, and it is highest for the motive "Intention unkind" (R^2=0.250 in model 3).

Finally, we analyze whether the punishment motive "pivotal" has an explanatory power *on top of* the other motives by combining all five punishment motives in one regression. Regression (6) in Table 3 reveals that the motives "choice unequal," "intention unkind," and "pivotal" all contribute to the explanation of the punishment pattern. In particular, the dummy variable "pivotal" remains significant, showing that being pivotal matters for the assignment of blame even when we control for other punishment motives. We summarize our results in the following:

> ***Result 2 (Pivotality vs. Standard Punishment Motives):*** *The punishment motive "pivotality" has a significant explanatory power for average punishment levels even if we control for the standard motives "outcome unequal," "choice unequal," "intention unkind," and the interaction "outcome unequal x intention unkind."*

4.3. Voting Behavior

In this section, we report on the voters' behavior. Overall, we find that the unequal allocation resulted in 67.4 percent of the cases. Table 4 provides a detailed overview of the voting behavior of Voters 1, 2, and 3 at each decision node and the expected payoffs that resulted from the respective choices.

The top two rows of Table 4 show that 58.3 percent of all Voters 1 voted for "unequal" and thus 41.7 percent for "equal."[8] The table further reveals that the decision between voting for "unequal" and "equal" involves a tradeoff. Voting for "unequal" increases the probability of the unequal allocation and thus the expected number of points before punishment, whereas voting for "equal" decreases expected punishment. The three rightmost columns report the expected number of allocated points before punishment, the expected punishment, and the expected payoff (allocated points minus punishment) of a particular voting choice at a given decision node. For Voters 1, the gain from increasing the likelihood of implementing the unequal allocation by voting for "unequal" (8.53-6.53=2) outweighs the loss from increased punishment (1.70-

[8] The decisions of a subset of 43 voters, who voted for the unequal allocation as decisive Voters 3, are shown in the column to the right of the decisions of all voters. We discuss this subset later in this section.

0.11=1.59), such that the expected payoff of voting for "unequal" (6.83) is larger than the expected payoff of voting for "equal" (6.42).

Table 4: Voting decisions and expected payoffs at each decision node

Voter	Voting sequence (decision in bold)	Voter decision [%] All voters (n=72)	Voter decision [%] Decisive Voters 3 voting for "unequal" (n=43)	Expected points before punishment	Expected punishment	Expected payoff
1	**u**-…	58.3	76.7	8.53	1.70	6.83
	e-…	41.7	23.3	6.53	0.11	6.42
2	u-**u**-…	59.7	79.1	9	1.90	7.10
	u-**e**-…	40.3	20.9	7.83	0.08	7.75
	e-**u**-…	61.1	81.4	7.5	1.68	5.82
	e-**e**-…	38.9	18.6	5	0.07	4.93
3	u-u-**u**	22.2	18.6	9	0.86	8.14
	u-u-**e**	77.8	81.4	9	0.26	8.74
	u-e-**u**	70.8	100	9	2.39	6.61
	u-e-**e**	29.2	0	5	0.08	4.92
	e-u-**u**	62.5	100	9	2.33	6.67
	e-u-**e**	37.5	0	5	0.08	4.92
	e-e-**u**	1.4	2.3	5	0.92	4.08
	e-e-**e**	98.6	97.7	5	0.03	4.97

Notes: "u" denotes a vote for the unequal allocation; "e" denotes a vote for the equal allocation.

Turning to Voters 2, Table 4 shows that 59.7 and 61.1 percent of all Voters 2 voted for "unequal" subsequent to Voter 1 voting for "unequal" and "equal," respectively. Consider first the situation in which Voter 1 voted for "unequal." Voters 2 could then increase their expected payoff by voting for "equal." Voting for "unequal" in that situation yields 9 points before punishment and an expected punishment of 1.9 points. Voting for "equal" reduces the expected number of points before punishment (7.83) but it also reduces the expected punishment (0.08). The reduction in punishment (1.9-0.08=1.82) thus more than compensates for the reduction of the expected number of points before punishment (9-7.83=1.17). Consider now the situation in which Voter 1 voted for "equal." The expected payoff for Voters 2 is now higher when they vote for "unequal." In expectation, voting for "unequal" in this situation yields 7.5 points before punishment, a punishment of 1.68 points, and thus a payoff of 5.82 points. By voting for "equal," Voters 2 implement the equal allocation, i.e., a payoff of 5 points before punishment. The expected payoff is thus lower, even though there is almost no punishment (0.07) for Voters 2 in that case.

We finally turn to Voters 3. Consider first the two cases where Voters 1 and 2 opted for different allocations, such that Voter 3 has the decisive vote. In these cases, the expected payoff of Voters 3 is higher if they implement the unequal allocation. The increase in the payoff before punishment (9-5=4) is larger than the increase in expected punishment at the two respective decision nodes (2.39-0.08=2.31 and 2.33-0.08=2.25). In both cases, we find that the majority of Voters 3 voted for "unequal" (70.8 and 62.5 percent). In the two cases where Voters 1 and 2 already implemented the unequal or equal allocation, Voters 3 maximize their expected payoffs by voting for "equal" because this reduces the expected punishment. We find that all but one Voter 3 voted for "equal" when Voters 1 and 2 implemented the equal allocation. However, 22 percent of Voters 3 (16 of 72) voted for "unequal" when Voters 1 and 2 implemented the unequal allocation. This latter finding is surprising, also in light of the low-cost theory of expressive voting (see e.g. Brennan and Lomasky, 1993), which would predict that of those Voters 3 whose votes are inconsequential, all opt for the socially more desirable equal allocation. Our findings on the behavior of these Voters 3 are more consistent with experimental results by Tyran (2004), who finds that many voters "bandwagon," i.e., vote for the option that they expect (or know) the majority of other voters to vote for.

A final question arises as a result of our main finding that pivotality increases the blame for the unequal allocation: Do those voters who reveal their preference for the unequal allocation avoid being pivotal for the unequal allocation? In our game, in case

Voter 1 opts for the unequal allocation, do some Voters 2 "delegate" the pivotal vote by strategically opting for the equal allocation?

Recall that we used the strategy method for voters. This allows us to address the question above, as we can compare voters' decisions across decision nodes. In particular, we are interested in those voters who opt for the unequal allocation as decisive Voter 3 (i.e., in situations in which Voters 1 and 2 opted for different allocations). Observing a voter's choices at these decision nodes provides us with a measure of her preference over the two allocations. Note that a voter is even pivotal (and thus blamed most) when she votes for the unequal allocation at these decision nodes. Among our 72 voters, 43 always chose the unequal allocation as Voter 3 when their choice was decisive.[9] The respective column in Table 4 shows the voting behavior of these 43 voters separately. We find that 20.9 percent of these voters (9 of 43) opted for the equal allocation as Voter 2 subsequent to Voter 1 voting for the unequal allocation. This means that they delegate the pivotal choice to the subsequent voter—potentially in the hope that the last voter will secure the unequal allocation and take the blame.[10] We summarize this last observation in the following:

[9] Voter 3's choice is decisive at two decision nodes. We consider only those 43 voters who revealed twice and thus consistently that they prefer the unequal allocation at these decision nodes. Ten voters opted only once for the unequal allocation in the role of the decisive Voter 3. If we took them into account as well, the fraction of voters who delegate would slightly increase to 23 percent (12 out of 53).

[10] Table 4 further shows that the 43 voters whom we classify as having a preference for the unfair allocation based on their decisive vote as Voter 3, also vote more frequently than the other voters for "unequal" in the roles of Voter 1 and 2. 23.3 percent of the 43 voters vote for "equal" as Voter 1, a behavior that is consistent with the idea that these voters prefer to delegate the vote for the unequal allocation to subsequent voters. 18.6 percent of the 43 voters vote for "equal" in the role of Voter 2 if Voter 1 voted for "equal." This behavior could be interpreted as an aversion for being the first voter to vote for "unequal."

Result 3 (Pivotality and Voting Behavior): *About one-fifth of those voters who reveal their preference for the unequal allocation when their vote as the last voter is decisive avoid being pivotal for the unequal allocation as the second voter and delegate the pivotal choice to the subsequent voter.*

5. Conclusion

In this paper, we addressed the question of responsibility attribution for individual members of collective decisions making entities, such as committees or boards. In particular, we analyzed whether people are blamed for being pivotal if they implement an unpopular outcome in a sequential voting process. We measured responsibility attribution by assigned punishment points in an experimental voting game. Our main result is that pivotal decision makers are blamed significantly more than non-pivotal decision makers. This finding lends support to Shapley and Shubik's (1954) assumption that the pivotal voter in a collective decision "is given credit" for having passed the decision. Our results contribute to a better understanding of responsibility attribution for collective decision making in general and they have specific implications for the theoretical work on committee decisions, as they question, for example, the equivalence of transparent sequential and simultaneous voting procedures (see e.g. Levy, 2007).

Our experiment also showed that about one-fifth of voters who revealed a preference for the unequal allocation in the situation where their vote as the last voter is decisive opt for the equal allocation as the second voter subsequent to the first voter voting for the unequal allocation. This observation suggests that some voters strategically delegate the pivotal decision to subsequent voters. Our study thus extends existing experimental results by, e.g., Hamman et al. (2010), (Coffman, 2011), and Bartling and Fischbacher (2012), who show that many subjects shirk the responsibility for unpopular decisions by delegating the decision right.

The strength, and maybe the weakness, of our experimental design is that it reduces the decision-making context to one that renders pivotality very salient. While this helps isolate the effect of pivotality on responsibility attribution, the voting that actually takes place in collective decision-making entities outside the laboratory has a richer set of characteristics than our sequential, simple majority voting game over two given outcomes. For instance, recent results by Duch et al. (forthcoming) indicate that other factors, such as proposal power and voting shares, are also important for responsibility attribution.

Moreover, our study focuses on a sequential voting game, whereas many voting processes exist where votes are cast simultaneously. However, our results on the effect of pivotality on responsibility attribution might be relevant also for simultaneous voting processes—in particular if decision makers' preferences over proposals are known. In the context of our game, consider, for example, a situation where it is publicly known that voter "U" strongly favors the unequal allocation and that voter "E" strongly favors the equal allocation. There is also a voter "P", but the only public knowledge is that she has neither a strong preference for the equal allocation (like voter type E) nor for the unequal allocation (like voter type U). Suppose further a committee of three voters that consists of one U, one E, and one P. Now, even with a secret and simultaneous vote, it is clear that P is the pivotal voter who tips the scales. Suppose the unequal allocation results. Then, on the one hand, U might be considered to be the most blameworthy "type" as it is known that she has the strongest preference for the unequal allocation. While the voting outcome reveals that P tends more towards the unequal than towards the equal allocation, she is nevertheless not type U, and thus potentially a less blameworthy "type." Hence, on the one hand, behavioral economics models of "type-based" reciprocity (e.g. Levine, 1998) would predict higher punishment for U than for P.

Our results, on the other hand, predict that P would be punished for being pivotal, which could, in principle, lead to higher punishment for P than for U.

One natural interpretation of the above situation is a left/centrist or right/centrist coalition in parliament, possibly with a small centrist party and larger “anchor parties” on the left and the right, each not large enough to pass legislation on their own. How would constituents hold the coalition parties accountable for bad performance? Our result on the impact of pivotality on responsibility attribution would suggest that the centrist party, which tips the scales, would be held responsible. But alternative responsibility attribution heuristics that are discussed in the political science literature, such as proposal power or voting weights (Duch et al, 2015), would suggest that the respective larger anchor party would be held responsible as it typically also has proposal power. The example shows that it will be interesting to further explore in future research how people assign responsibility in collective decision making contexts, and how this depends on the specific features of the voting rules and the nature of the information available.

References

Alesina, A., 1997. *Political cycles and the macroeconomy*. The MIT Press.

Anderson, C., 1995. *Blaming the government: Citizens and the economy in five European democracies*. ME Sharpe Inc.

Bank of England, 2005. *Who sets our interest rates? Inside the Monetary Policy Committee*, www.bankofengland.co.uk/publications/Documents/other/monetary/inside_mpc.pdf (accessed: 2014-01-22).

Banzhaf, J.F., 1964. Weighted voting doesn't work: A mathematical analysis. *Rutgers L. Rev.* 19, 317.

Bartling, B., Fischbacher, U., 2012. Shifting the blame: On delegation and responsibility. *The Review of Economic Studies* 79, 67-87.

Bolton, G.E., Ockenfels, A., 2000. ERC: A theory of equity, reciprocity, and competition. *The American Economic Review* 90 166-193.

Brandts, J., Charness, G., 2011. The strategy versus the direct-response method: a first survey of experimental comparisons. *Experimental Economics* 14, 375-398.

Brennan, G., Lomasky, L., 1993. *Democracy and decision: The pure theory of electoral politics*. Cambridge: Cambridge University Press.

Coffman, L.C., 2011. Intermediation reduces punishment (and reward). *American Economic Journal: Microeconomics* 3, 77-106.

Duch, R., Przepiorka, W., Stevenson, R., 2015. Responsibility attribution for collective decision makers. *American Journal of Political Science* 59, 372-389.

Duch, R.M., Stevenson, R.T., 2008. *The economic vote: How political and economic institutions condition election results*. Cambridge University Press.

Dufwenberg, M., Kirchsteiger, G., 2004. A theory of sequential reciprocity. *Games and Economic Behavior* 47, 268-298.

Falk, A., Fischbacher, U., 2006. A theory of reciprocity. *Games and Economic Behavior* 54 293-315.

Falk, A., Szech, N., 2013. *Organizations, diffused pivotality and immoral outcomes*, IZA Discussion Papers No. 7442.

Fehr, E., Schmidt, K.M., 1999. A theory of fairness, competition, and cooperation. *Quarterly Journal of Economics* 114, 817-868.

Finer, S.E., 1975. *Adversary politics and electoral reform*. London: Anthony Wigram.

Fischbacher, U., 2007. z-Tree: Zurich toolbox for ready-made economic experiments. *Experimental Economics* 10, 171-178.

Franzese Jr, R.J., 2002. *Macroeconomic policies of developed democracies*. Cambridge University Press.

Gerlach-Kristen, P., Meade, E., 2011. Is there a limit on FOMC dissents? Evidence from the Greenspan era. *Working Paper*.

Greiner, B., 2004. *An online recruitment system for economic experiments*, in: Kremer, K., Macho, V. (Eds.), Forschung und wissenschaftliches Rechnen GWDG Bericht 63. Gesellschaft für Wissenschaftliche Datenverarbeitung, Göttingen, 79-93.

Hamman, J.R., Loewenstein, G., Weber, R.A., 2010. Self-interest through delegation: An additional rationale for the principal-agent relationship. *The American Economic Review* 100, 1826-1846.

Levine, D.K., 1998. Modeling altruism and spitefulness in experiments. *Review of Economic Dynamics* 1 593-622.

Levy, G., 2007. Decision making in committees: Transparency, reputation, and voting rules. *The American Economic Review* 97, 150-168.

Lewis-Beck, M.S., 1990. *Economics and elections: The major Western democracies*. University of Michigan Press.

Lijphart, A., 2012. *Patterns of democracy: Government forms and performance in thirty-six countries*. Yale University Press.

Penrose, L.S., 1946. The elementary statistics of majority voting. *Journal of the Royal Statistical Society* 109, 53-57.

Powell, G.B., Whitten, G.D., 1993. A cross-national analysis of economic voting: taking account of the political context. *American Journal of Political Science* 37, 391-414.

Rabin, M., 1993. Incorporating fairness into game theory and economics. *The American economic review* 83, 1281-1302.

Shapley, L.S., Shubik, M., 1954. A method for evaluating the distribution of power in a committee system. *American Political Science Review* 48, 787-792.

Tsebelis, G., 2011. *Veto players: How political institutions work*. Princeton University Press.

Tyran, J.-R., 2004. Voting when money and morals conflict: An experimental test of expressive voting. *Journal of Public Economics* 88, 1645-1664.

Weiner, B., 1979. A theory of motivation for some classroom experiences. *Journal of Educational Psychology* 71, 3-25.

Online Appendix

Pivotality and Responsibility Attribution in Sequential Voting

Björn Bartling Urs Fischbacher Simeon Schudy

1. Controllability and punishment behavior

In this appendix, we discuss how the punishment predictions derived from the formal economic theories of social preferences in the main text relate to psychological concepts of attribution (Heider, 1958; Jones et al., 1972; Weiner, 1986, 1995). Attribution theory focuses on the relationship between outcomes and the perceived causes of the outcome and assumes that perceived causes of events share common properties. One of these properties (among others) is "controllability" (Weiner, 1979), i.e., the extent to which a person was in control of causing a particular outcome. In this appendix, we consider three different conceptualizations of controllability in the context of our voting game and investigate their ability to explain the observed punishment behavior. The first conceptualization of controllability captures whether or not a person was in control in the sense of being able to *prevent* the unequal outcome. The second conceptualization captures whether or not a person was able to *implement* the unequal outcome. The third conceptualization is based on the of a person's *degree of decisiveness*. For all three conceptualizations we focus on cases in which the respective voter chose the unequal allocation and the unequal outcome occurred (as we do in our analysis of the punishment motive pivotality).

Consider first the conceptualization of controllability that captures the ability of a voter to *prevent* the unequal outcome (see column 3 of Table A1 "Prevention"). Under this conceptualization, Voter 1 has a low level of control in our voting game because she cannot prevent the unequal outcome: even if she votes "equal," Voters 2 and 3 might vote "unequal" in which case the unequal allocation is implemented. If Voter 1 voted for the unequal allocation, also Voter 2 has a low degree of control because Voter 2 cannot prevent the unequal outcome: even if she votes "equal," Voter 3 might vote "unequal" in which case the unequal allocation is implemented. In contrast, if Voter 1 voted for the equal allocation, Voter 2 has the highest degree of control, because by voting for the equal allocation she can now prevent the unequal outcome. If the outcome is already determined by the votes of Voters 1 and 2, Voter 3 has no control. But if Voters 1 and 2 voted for diverging allocations, Voter 3 has the highest degree of control because now she can prevent the unequal outcome. Comparing column 3 to the rightmost column in Table A1 shows how the punishment motives presented in Section 3 of the main text correspond to the conceptualization of controllability based on prevention. Figure A1 illustrates that actual punishment co-varies in the predicted way with this first conceptualization of controllability.

Table A1: Different conceptualizations of controllability

Voter	Voting sequence	Measures of Control			Punishment motives from Section 3
		Prevention	Implementation	Decisiveness	
1	**u** –…–…	Low	Low	Low	Intention unkind
2	u – **u** –…	Low	High	Intermediate	Pivotal
	e – **u** –…	High	Low		Intention unkind
3	u – u – **u**	No	No	No	Choice unequal
	e – e – **u**				Choice unequal
	u – e – **u**	High	High	High	Pivotal
	e – u – **u**				Pivotal

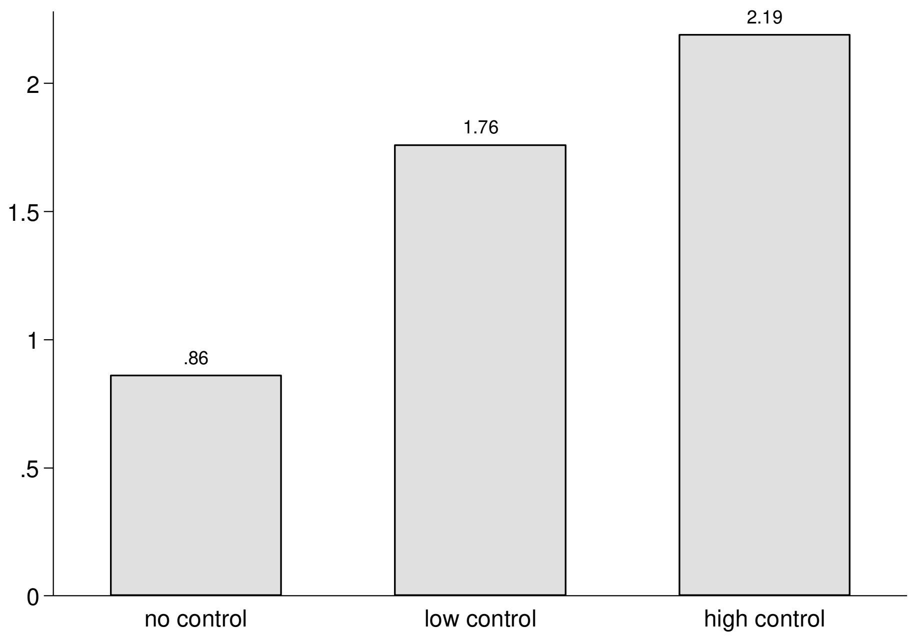


Figure A1: Mean punishment for the different degrees of the ability to "prevent" the unequal outcome, given the unequal outcome results.

Consider next the second conceptualization of controllability, based on the ability to *implement* the unequal outcome. Again, Voter 1 has a low level of control because she cannot implement the unequal outcome: even if she votes for the unequal allocation, Voters 2 and 3 might vote for the equal allocation, which would then be implemented. If Voter 1 voted for the equal allocation, also Voter 2 has a low degree of control, because she cannot implement the unequal outcome in this case. But if Voter 1 voted for the unequal allocation, Voter 2 has the highest degree of control because she can now implement the unequal outcome. Voter 3 has again either no control or the highest degree of control, depending on the preceding votes by Voters 1 and 2. Figure A2 illustrates that also this second conceptualization of controllability corresponds to average punishment received by the voters as predicted by the theory.

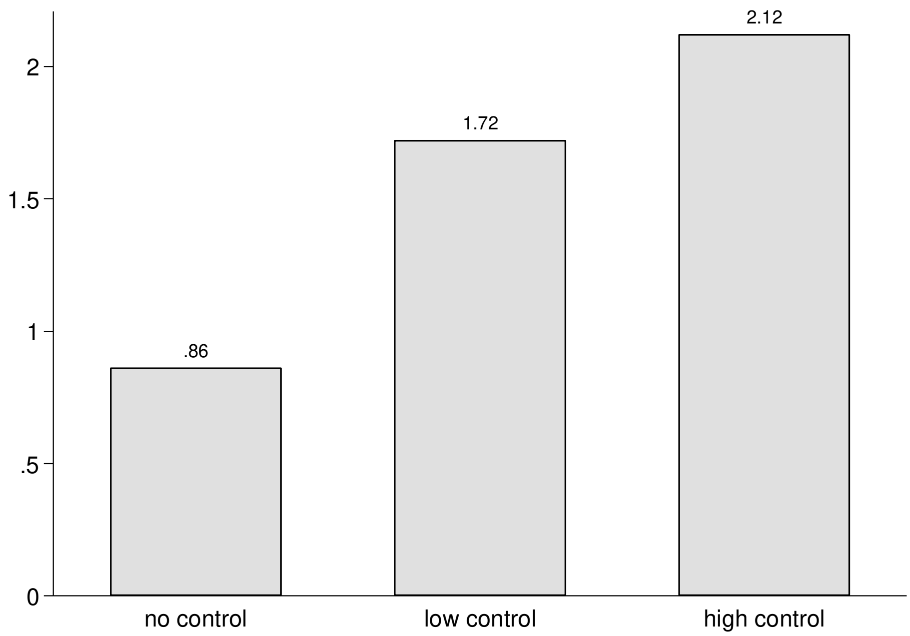


Figure A2: Mean punishment for the different degrees of the ability to "implement" the unequal outcome, given the unequal outcome results.

Consider finally the third conceptualization of controllability, which differentiates between a voter's ability to implement only one of the outcomes and the ability to implement *any* outcome. This conceptualization is meant to capture the "degree of decisiveness" and differs from the two preceding ones insofar as it assigns the same (intermediate) level of control to Voter 2 independently of Voter 1's votes (see Table A1, column 5 "Decisiveness"). If Voter 1 voted for the unequal allocation, Voter 2 can only implement the unfair outcome but not the fair one, hence her level of control is only intermediate. (Similarly, if Voter 1 voted for the fair allocation, Voter 2 could only implement the fair but not the unfair allocation.) Our third conceptualization keeps the features that Voter 1 has a low level of control because she can neither prevent nor implement the unequal outcome and that Voter 3 has either no control (if the outcome is already determined) or the highest degree of control (if Voters 1 and 2 voted for diverging allocations). In the latter case, Voter 3 has the highest degree of control (and not only an intermediate one) because she can implement either the fair or the unfair allocation. That is, she has a higher degree of decisiveness than Voter 2. Figure A3 shows that also this third conceptualization of controllability correlates positively with the punishment points received by voters.

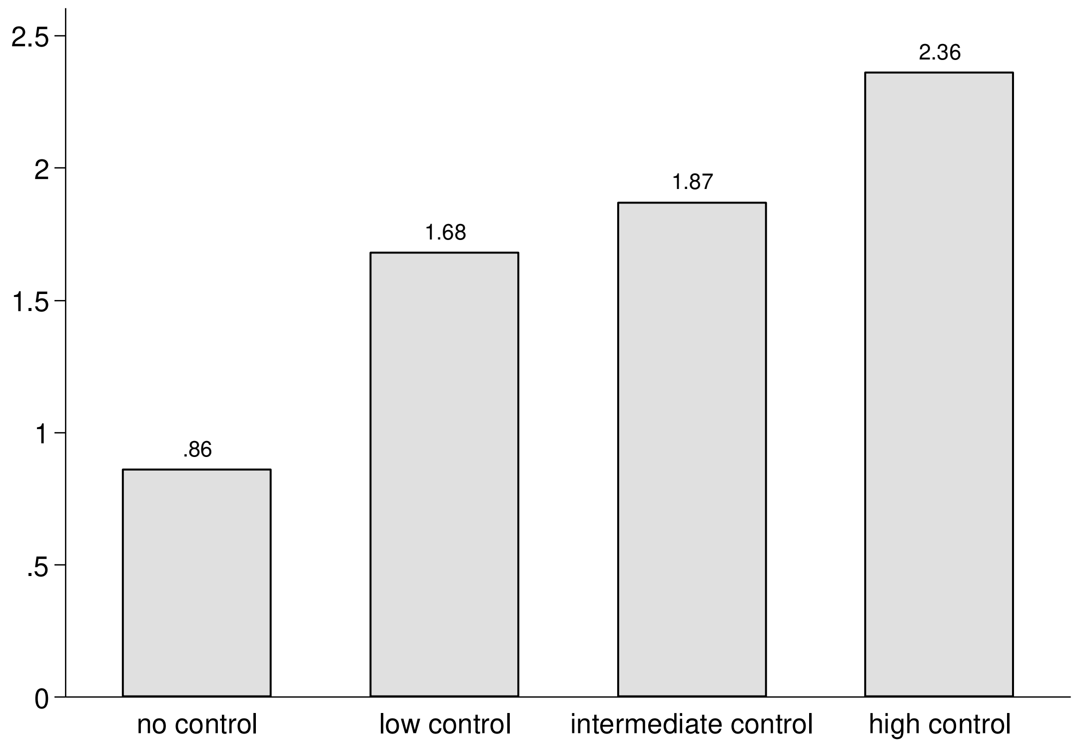


Figure A3 Mean punishment for the different degrees of "decisiveness", given the unequal outcome results.

Table A2 complements our econometric analysis from Table 3 on the different punishment motives by adding controllability as an explanatory variable that takes on values 0, .5, .75, and 1 for the respective degrees of control (no, low, intermediate, high), as specified in Table A1. As Figures A1, A2 and A3 suggest, all variants of controllability correlate positively with the received punishment. Models (A1), (A2), and (A3) in Table A2 show that this relation is statistically significant.

Table A2: An econometric comparison of different punishment motives

OLS	(A1)	(A2)	(A3)	(A4)	(A5)
Outcome unequal				0.048	0.048
				(0.070)	(0.070)
Choice unequal				0.782***	0.782***
				(0.137)	(0.137)
Intention unkind				0.517**	0.517**
				(0.197)	(0.197)
Outcome unequal				-0.135	-0.135
x Intention unkind				(0.251)	(0.251)
Pivotal				0.318**	-0.021
				(0.152)	(0.171)
Controllability	2.053***			0.679***	
(prevention)	(0.220)			(0.171)	
Controllability		1.904***			
(implementation)		(0.208)			
Controllability			0.730***		0.339***
(decisiveness)			(0.079)		(0.085)
Constant	0.406***	0.401***	0.420***	0.083**	0.083**
	(0.056)	(0.056)	(0.057)	(0.037)	(0.037)
Observations	1,728	1,728	1,728	1,728	1,728
R^2	0.209	0.211	0.209	0.284	0.284

Notes: The dependent variable is punishment points for voters. *Outcome unequal* is a dummy variable which equals 1 if the unequal allocation is chosen. *Choice unequal* is a dummy variable which equals 1 if a voter opts for the unequal allocation. *Intention unkind* is a dummy variable which equals 1 if a voter opts for the unequal allocation and no majority was reached before her vote. *Pivotal* is a dummy variable which equals 1 if a voter is pivotal for the unequal allocation. *Controllability* refers to a variable that can take on the values 0, .5, .75 and 1 for the respective degrees of control (no, low, intermediate, high control), as specified in Table A1. Standard errors, clustered on 72 individuals, are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Model (A4) corresponds to regression model (6) from Table 3 in the main text but adds our first controllability measure based on prevention. The model shows that "Choice unequal," "Intention unkind," "Pivotality," and "Controllability" matter significantly for the assignment of punishment. Our second controllability measure that is based on whether or not a voter could implement the unequal outcome is a linear combination of unkind intention and pivotality. Thus, it does make sense to add it to regression model (6). Finally, model (A5) adds our third controllability measure that distinguishes between different degrees of "decisiveness" to regression model (6). Recall from Table 1 in the main text that punishment is particularly high for the pivotal Voter 3, compared to the pivotal Voter 2. Since our third conceptualization of controllability differentiates between a Voter 2 who votes for the unequal allocation (subsequent to Voter 1 voting for the unequal allocation) and a Voter 3 who votes for the unequal allocation (subsequent to diverging votes by Voters 1 and 2), controllability explains more of the variation than the Pivotality dummy. Since the latter correlates strongly with the controllability measure, it is not significant in regression model (A5) any longer.

References

Heider, F., 1958. *The psychology of interpersonal relations*. Whiley, New York.

Jones, E.E., Kanouse, D.E., Kelley, H.H., Nisbett, R.E., Valins, S., Weiner, B., 1972. *Attribution: Perceiving the causes of behavior*. General Learning Press Morristown, New Jersey.

Weiner, B., 1979. A theory of motivation for some classroom experiences. *Journal of Educational Psychology* 71, 3-25.

Weiner, B., 1986. *An attributional theory of motivation and emotion*. Springer-Verlag New York.

Weiner, B., 1995. *Judgments of responsibility: A foundation for a theory of social conduct*. Guilford Press.

2. English version of the original German Instructions

We present a full translation of the instructions for participants A and indicate the respective differences with respect to instructions for participants B with *"[ ]"*.

General Information

We cordially welcome you to this economic study.

If you read the following instructions carefully, you will be able to earn money in addition to the 12 Swiss Francs that you receive for participating in this study. The actual amount you will earn depends on your decision and others decisions. Therefore it is important that you read the instructions carefully. If you have any questions, please let us know.

During the study you are not allowed to talk to any other participant. If you break the no communication rule we may exclude you from the experiment and payments.

In the experiment we do not talk about Swiss Francs, we talk about Points. The numbers of points you earn in the experiment are converted into Swiss francs with the following exchange rate.

1 Point = 3 Swiss Francs

After the study is finished you will receive the number of points earned in the experiment converted into Swiss Francs plus 12 Swiss Francs for participating in **cash.**

The following pages will explain the experiment in detail.

The Study

At the beginning 5 other participants of this study are randomly and anonymously assigned to you. You will not learn the identity of these participants, neither before nor after the study. Also, no other participant will learn your identity. The study consists of one round. This means every participant makes her decisions once.

There are two types of participant, Type A and Type B.

You are Type A. *[B]*

Every group consists of three participants A and three participants B. Thus, you have been assigned two *[three]* participants A and three *[two]* participants B.

In this study, the three participants A decide by majority rule, how 30 points are allocated between the three participants A and the three participants B.

Participants A have to decide between two possible allocations of points:

- **Allocation 1:** Participants A receive 9 points each and participants B receive 1 point each.

- **Allocation 2:** Participants A and participants receive 5 points each.

The following table shows the two allocations between which participants A have to decide.

	A	A	A	B	B	B
Allocation 1	9	9	9	1	1	1
Allocation 2	5	5	5	5	5	5

The allocation which receives the majority of votes will be implemented. This means if two or three participants A vote for allocation 1, allocation 1 will be implemented. If two or three participants A vote for allocation 2, allocation 2 will be implemented.

Abstention is not possible. Each participant A hast to choose either allocation 1 or allocation 2.

The voting procedure:

Participants A vote one after another.

1. The Participant A, who decides first, is called **A1**.

2. The participant A, who votes second, is called **A2**. Before Participant A2 decides, she observes the decision of participant A1

3. The participant A, who votes last, is called **A3**. Before Participant A3 decides, she observes the decision of participant A1 and A2.

The allocation for which at least two participants A voted is implemented.

The voting result is known, as soon as two participants A have voted for the same allocation.

Decisions by Participants B:

Participants B do not only observe the result of the vote but also how each participant A has decided. This means participants B observe, how the first voter A1 decided, then how the second voter A2 decided and finally how the third voter A3 decided.

Then participants B have the possibility to deduce points from the payoffs of participants A1, A2 and A3. One participant B will be randomly determined and may deduce up to 7 points in total from participants A.

Deducing points causes a cost: If participant B wants to deduce points from participants A, she hast o give up 1 point to deduce up to a 7 points.

It is possible to deduce between 0 and 7 points (integers only). As soon as at least on point is deducted, participant B incurs the cost of 1 Point. **Deduction costs are 1 point, independent of the number of points deduced.**

For example, if participant B deduces 7 points from participant A3, A3's payoff is reduced by **7 points** but also participant B's payoff is reduced by **1 point**.

If participant B deduces **5 points** from participant A1 and 1 point from participant A2, A1's payoff is reduced by **5 points** and A2's payoff is reduced by 1 point but also participant B's payoff is reduced by **1 point,** although participant B deduced only 6 points in total.

The only restrictions with respect to the deduction of points is that participant B can never deduce more than 7 points in total and that given the implemented allocation the payoff of participant A can never be reduced by more points than participant A owned. If for instance the implemented allocation is allocation 1 (9, 9, 9; 1, 1, 1), participant B cannot deduce more than 7 points from a participant A. If the implemented allocation is allocation 2 (5, 5, 5; 5, 5, 5), participant B can deduce in total 7 points but never deduce more than 5 points from a participant A.

Three examples:

<u>Example 1</u>:

Participant A1 chooses Allocation 1 (9, 9, 9; 1, 1, 1).

Participant A2 observes A1's decision and then chooses Allocation 2 (5, 5, 5; 5, 5, 5).

Participant A3 observes A1's and A2's decisions and then chooses Allocation 1 (9, 9, 9; 1, 1, 1).

Hence, the voting result is Allocation 1 (9, 9, 9; 1, 1, 1).

All Participants B observe which allocation was chosen as well as the individual voting decisions by A1 A2 and A3

Participant B1 is randomly selected and can deduce points from participants A.

B1 deduces participant A1 **2 Points**, Participant A2 **5 Points** and Participant A3 **0 Points**.

This results in the following payoffs:

	Decisions by participants A	Allocation 1 is implemented	Deduction points	Deduction cost	Payoffs
A1	Allocation 1	9	2	–	7
A2	Allocation 2	9	5	–	4
A3	Allocation 1	9	0	–	9
B1	–	1	–	1	0
B2	–	1	–	0	1
B3	–	1	–	0	1

<u>Example 2</u>:

Participant A1 chooses die Allocation 2 (5, 5, 5; 5, 5, 5).

Participant A2 observes A1's decision and then chooses Allocation 2 (5, 5, 5; 5, 5, 5).

Hence, the voting result is Allocation 2 (5, 5, 5; 5, 5, 5).

Participant A3 observes A1's and A2's decisions and chooses Allocation 1 (9, 9, 9; 1, 1, 1).

All Participants B observe which allocation was chosen as well as the individual voting decisions by A1 A2 and A3

Participant B2 is randomly selected and can deduce points from participants A.

B1 deduces participant A1 **2 Points**, Participant A2 **1 Points** and Participant A3 **2 Points**.

This results in the following payoffs:

	Decisions by participants A	Allocation 2 is implemented	Deduction points	Deduction cost	Payoffs
A1	Allocation 2	5	2	–	3
A2	Allocation 2	5	1	–	4
A3	Allocation 1	5	2	–	3
B1	–	5	–	0	5
B2	–	5	–	1	4
B3	–	5	–	0	5

<u>Example 3</u>:

Participant B3 is randomly selected and can deduce points from participants A.

Participant B3 deduces no points from any participant A. Participant B3 thus incurs no deduction cost.

Thus, the points resulting from the implemented allocation are equivalent to the payoffs.

[This page appeared only in instructions for participants A]

Your decisions as Participant A:

Before you learn whether you are participant A1, A2 or A3 we ask you to state how you would decide in each possible situation in the role of participant A1, in the role of participant A2 and in the role of participant A3.

There are **seven** possible situations in which a participant A may decide:

If you are participant A1, you will

1. Decide whether you choose Allocation 1 or Allocation 2.

If you are participant A2, you will

2. decide <u>for the case in which participant A1 has chosen Allocation 1</u> whether you choose Allocation 1 or Allocation 2.

3. decide <u>for the case in which participant A1 has chosen Allocation 2</u> whether you choose Allocation 1 or Allocation 2.

If you are participant A3, you will

4. decide <u>for the case in which A1 and A2 have both chosen Allocation 1</u> whether you choose Allocation 1 or Allocation 2.

5. decide <u>for the case in which A1 and A2 have both chosen Allocation 2</u> whether you choose Allocation 1 or Allocation 2.

6. decide <u>for the case in which A1 has chosen Allocation 1 and A2 has chosen Allocation 2</u> whether you choose Allocation 1 or Allocation 2.

7. decide <u>for the case in which A1 has chosen Allocation 2 and A2 has chosen Allocation 1</u> whether you choose Allocation 1 or Allocation 2.

In this study we ask you to state for each of the seven situations how you would decide!

[This page appeared only in instructions for participants A]

If you (and the other participants A) have decided for each situation, participants A will be randomly assigned the role of A1, A2 and A3.

The allocation which results from the decisions stated by the three participants A will be implemented.

Thus if you are assigned the role A1, the decision you stated as A1 will be implemented.

If you are assigned the role A2, the decision you stated as A2 for the relevant case will be implemented. Which of the two decisions you stated as A2 will be implemented depends on the decision of the participant who was assigned the role of A1.

If you are assigned the role A3, the decision you stated as A3 for the relevant case will be implemented. Which of the four decisions you stated as A3 will be implemented depends on the decisions of the participants who were assigned the roles of A1 and A2.

Hence, each of the seven decisions can be decisive for your payoffs at the end of the study.

Since the study has only one round, you make each decision only once.

Thus carefully think about your decisions in each situation!

[This page appeared only in instructions for participants A]

After you made your decisions as participant A:

After all participants A have made their decisions and after it has been randomly determined which participant A acts as A1 A2 and A3, the relevant decisions are implemented.

All participants B are asked how they will decide if they can deduce points from participants A. Participants B see which decision participant A1 has made, which decision was made thereafter by participant 2 (given A1's decision) and finally which decision participant A3 has made (given the decisions by A1 and A2).

After all participants B made their decision, one participant B is randomly selected in each group, whose decisions are implemented. Deducing points causes deduction costs for this selected participant B. The costs for this participant B will amount to 1 point if the participant chose to deduce at least 1 point from a participant A and 0 points if the participant chooses not to deduce points. The other two participants B cannot deduce any points and therefore incur no deduction cost.

After all participants B made their decisions the study ends. The points you earned in the experiment will then be converted into Swiss Francs and paid in cash to you in addition to the 12 Swiss Francs, which you receive for showing up for the experiment.

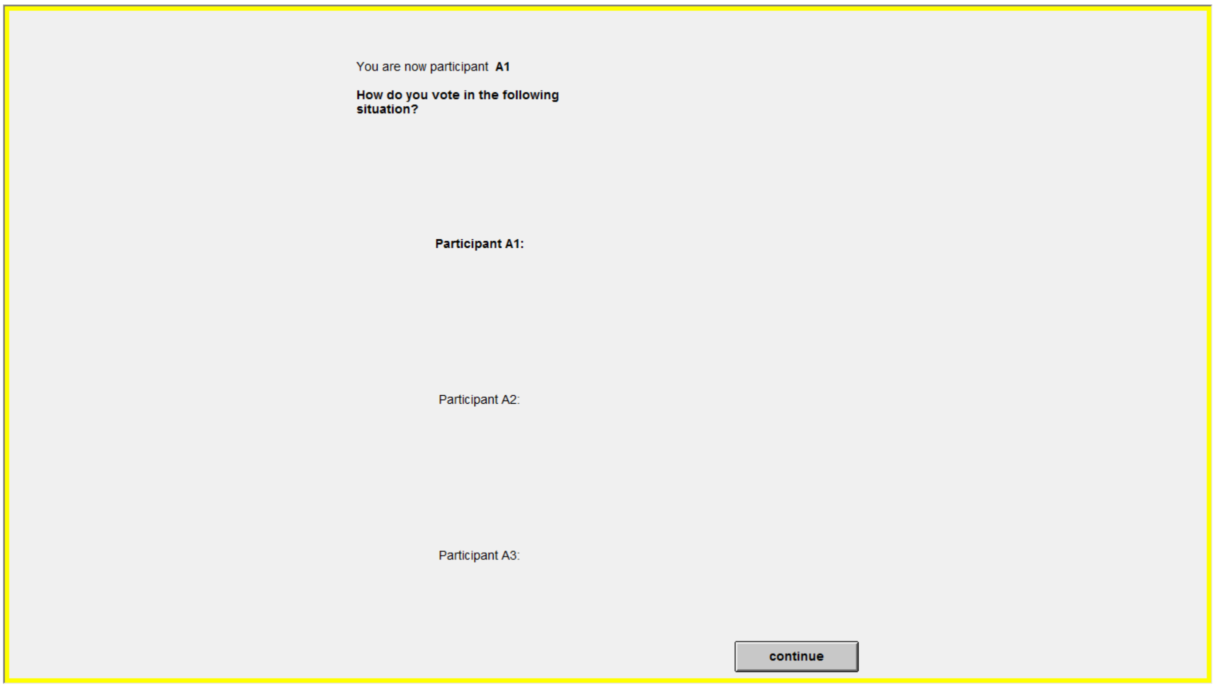
[This page appeared only in instructions for participants A]

The procedure on your computer screen:

The screens in which you make your decisions are structured as follows.

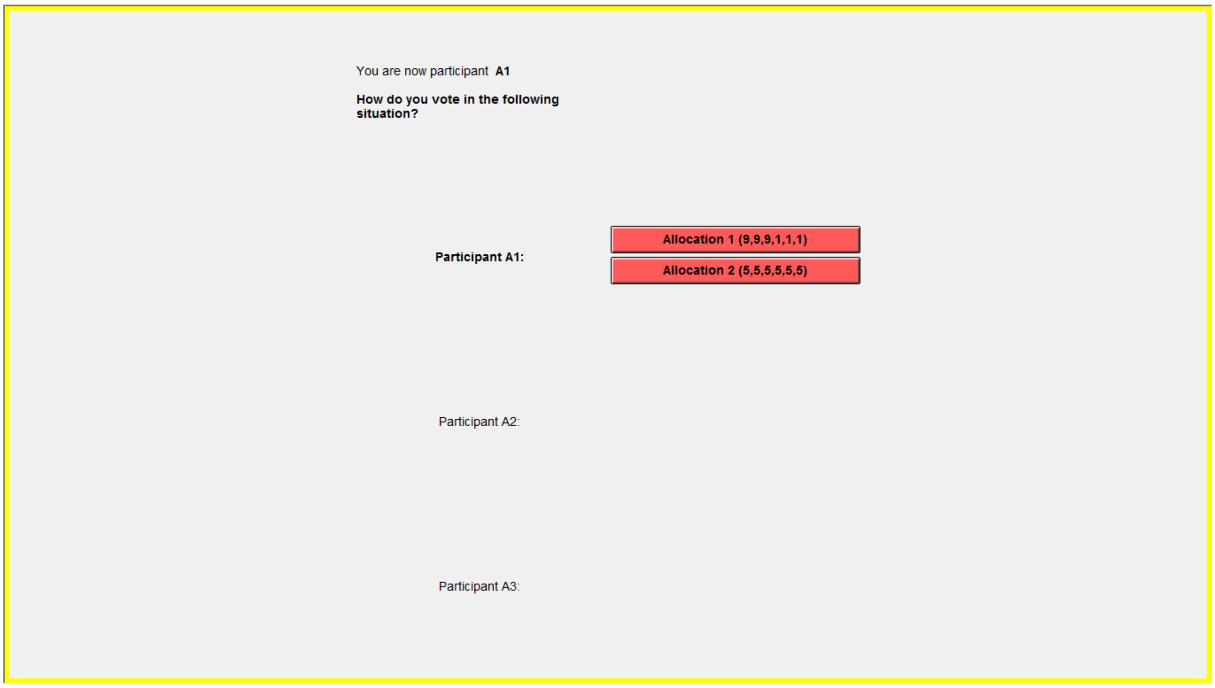
In the upper row you always see for which Role – A1, A2 or A3 you are deciding on the current screen. First you decide as participant A1.

In the example screen below you are deciding in the role of participant **A1**:



[This page appeared only in instructions for participants A]

After you have clicked “continue”, you can decide between Allocation 1 and Allocation 2. Please click on the field you want to choose using the mouse.



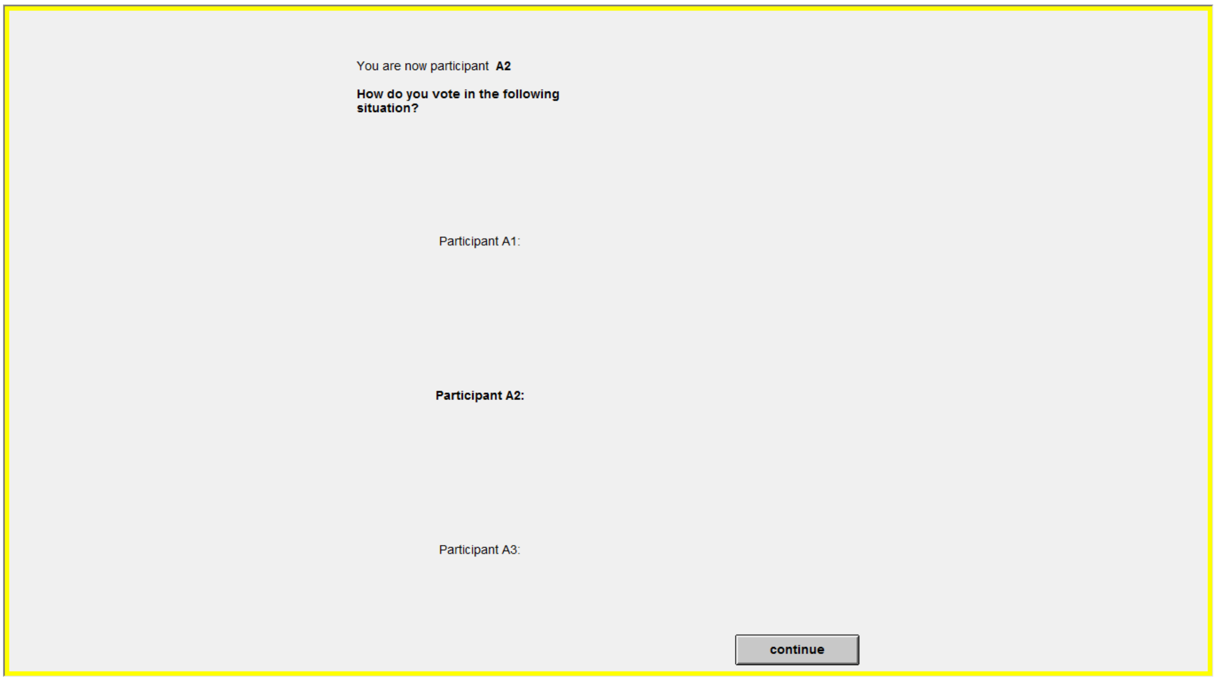
After you have clicked the button for Allocation 1 or Allocation 2, you advance to the next Situation. In the next situation you are allocate a role again.

On the next pages we explain another example.

[This page appeared only in instructions for participants A]

After you have decided as participant A1 you decide in the role of participant A2.

In the example screen below you are deciding in the role of participant **A2**

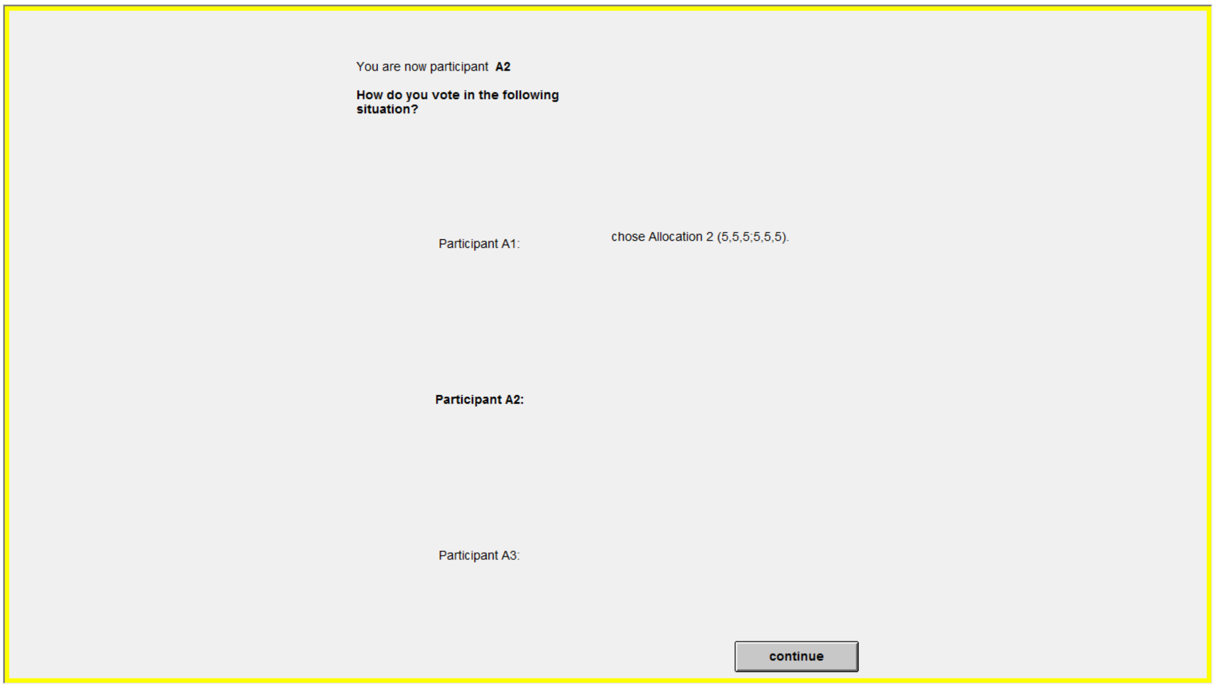


Again, you confirm that you have seen in which role you are deciding by clicking the "continue" button. :

[This page appeared only in instructions for participants A]

After you have clicked “continue”, you see first which decision was chosen by participant A1.

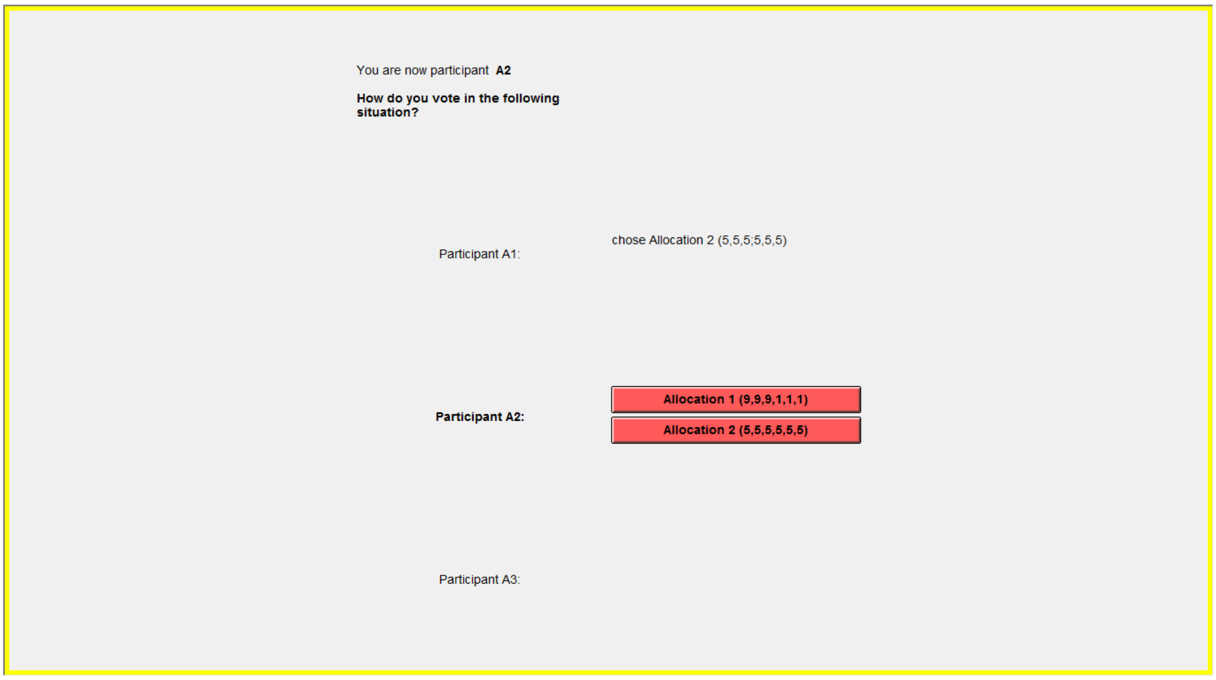
In the example below, participant A1 has chosen Allocation 2 (5,5,5;5,5,5).



You confirm that you have seen the decision by participant A1 by clicking the “continue” button. :

[This page appeared only in instructions for participants A]

After you have clicked "continue", you can decide. You can now – given the decision of Participant A1 – decide between Allocation 1 and Allocation 2. Please click on the field you want to choose using the mouse.



After you have clicked the button for Allocation 1 or Allocation 2, you advance to the next Situation. Thus, if you decide in the role of participant A2 or A3, you will first learn the decisions by participant(s) deciding before you (i.e., A1 and if so A2). Only after you learned the decisions you can choose yourself.

You decide **once** in the role of participant A1, **twice** in the role of A2 and **four times** in the role of A3 (see also page 7 of the instructions).Please note that you will first decide as participant A1, then as participant A2 and finally as participant A3. However, the order of the different situations in the role of A2 and A3 is random (the order does not necessarily correspond to the order on page 7). **Please always be aware for which situation you are currently deciding.**

Do you have any questions? Please raise your hand we will come to your cubicle.

Comprehension Questions:

Please answer the following comprehension questions. The questions ensure that you are familiar with the procedures of the study. **Decisions and Numbers in the question section (as well as in all examples in the instructions) were chosen randomly.** Your answers to the comprehension questions do not affect you payoff at the end of the study.

1. Assume the following decisions by participants A and that the decisions of participant B1 are implemented.

	As‘ Decision	**Resulting points?**	Deduction points by B1	**Deduction cost?**	**Payoffs?**
A1	Allocation 1		0	–	
A2	Allocation 2		2	–	
A3	Allocation 1		5	–	
B1	–		–		
B2	–		–		
B3	–		–		

Please fill in the points resulting from the implemented allocation as well as deduction cost for B1 and payoffs for all 6 participants.

2. Assume the following decisions by participants A and that the decisions of participant B2 are implemented.

	As‘ Decision	**Resulting points?**	Deduction points by B2	**Deduction cost?**	**Payoffs?**
A1	Allocation 2		2	–	
A2	Allocation 1		0	–	
A3	Allocation 2		1	–	
B1	–		–		
B2	–		–		
B3	–		–		

Please fill in the points resulting from the implemented allocation as well as deduction cost for B2 and payoffs for all 6 participants.

3. Assume the following decisions by participants A and that the decisions of participant B3 are implemented.

	As' Decision	**Resulting points?**	Deduction points by B3	**Deduction cost?**	**Payoffs?**
A1	Allocation 1		0	–	
A2	Allocation 2		0	–	
A3	Allocation 2		0	–	
B1	–		–		
B2	–		–		
B3	–		–		

Please fill in the points resulting from the implemented allocation as well as deduction cost for B2 and payoffs for all 6 participants.

4. In question "3." Participant B3 chose to deduce 0 points.

   a. How many points could have been deduced by participant B3 in total?

   b. How many points could have been deduced by participant B3 for each individual participant A?

   c. How many points would have been received by participant B3 if she deduced at least 1 point (given the implemented allocation)?

[Participants B were asked an additional question:]

5. In the experiment, you have to enter 24 decisions about deducing points (8 situations with three possibilities to deduce points).

   a. For how many of the 8 situations are your decisions implemented?

   b. Which deduction cost do you incur if you are the randomly chosen participant B who can deduce points and you deduced at least one point from one of the participants A?

After we have checked you answers it is reasonable to consider already how you will decide in this study.

[This page appeared only in instructions for participants B]

Your decision as Participant B:

Before you know whether you will be randomly selected to be the Participant B who may deduce points from participants A we ask you to state **for each possible situation** how you would decide as the randomly chosen participant B.,

There are **eight** possible situations, for which you have to decide how many points you would like to deduce from the participants A.

The eight situations the eight possible decision combinations of participants A: The following table shows the situations at one glance.

Sequence of decisions →

Situation	Participant A1 chooses	Participant A2 chooses	Participant A3 chooses
1	Allocation 1	Allocation 1	Allocation 1
2	Allocation 1	Allocation 1	Allocation 2
3	Allocation 1	Allocation 2	Allocation 1
4	Allocation 2	Allocation 1	Allocation 1
5	Allocation 1	Allocation 2	Allocation 2
6	Allocation 2	Allocation 1	Allocation 2
7	Allocation 2	Allocation 2	Allocation 1
8	Allocation 2	Allocation 2	Allocation 2

How to understand the table: Each row shows one situation. In situations 1 to 4 the implemented allocation is allocation 1. For example, Situation 3 means that Participant A1 decided for Allocation 1, then participant 2 decided for Allocation 2 und finally Participant 3 decided for Allocation 1. As another example, Situation 7 means that A1 decided for Allocation 2, then Participant A2 decided for Allocation 2 and finally Participant A3 decided for Allocation 1.

[This page appeared only in instructions for participants B]

Thus in this study we ask you to indicate <u>for each of the eight situations</u> how many points you want to deduce from A1, A2 and A3.

Please note: After you have stated for all eight situations how many points you want to deduce, one of the three participants B in your group will be randomly chosen and her decision for the actual situation will be implemented. **Only this Participant B incurs a cost of 1 Point for the deduction of points (if she chose to deduce points).**

Based on the decisions of participants A one of the eight situations occurs. If you are then randomly chosen to be the participant B who may deduce points from participants A your deduction decisions for that situation will be implemented.

To summarize:

In each group one participant B will be randomly selected, who can deduce points. Only the points of this randomly selected Participant B will be implemented for exactly that situation that actually occurred due to the decisions of Participants A1, A2 und A3 (of the respective group). In each group, only the randomly selected Participant B incurs a cost of 1 Point (if she decided to deduct points).

Since you do not know which situation will result and whether you are randomly selected, your decisions for each of the eight possible situations can be relevant for the payoffs at the and of the study.

Since the study lasts only one round, you make every decision just once.

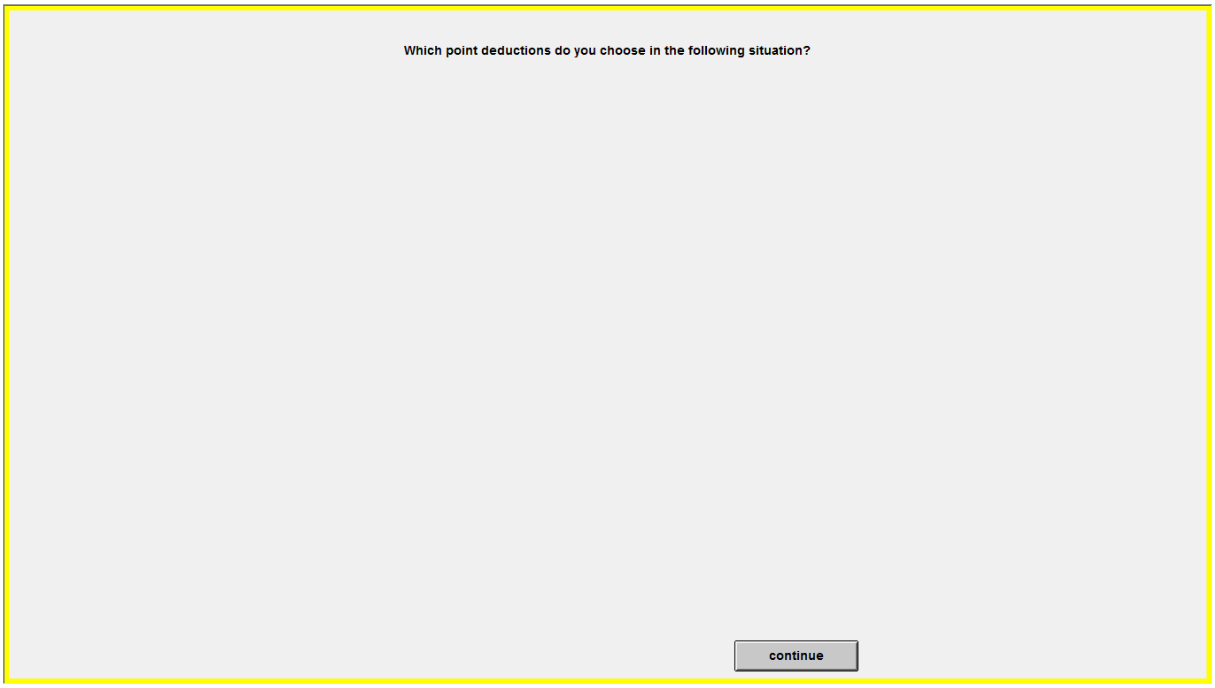
Thus, please carefully think about your decisions for all situations.

[This page appeared only in instructions for participants B]

The procedure on your computer screen:

The screens in which you make your decisions are structured as follows.

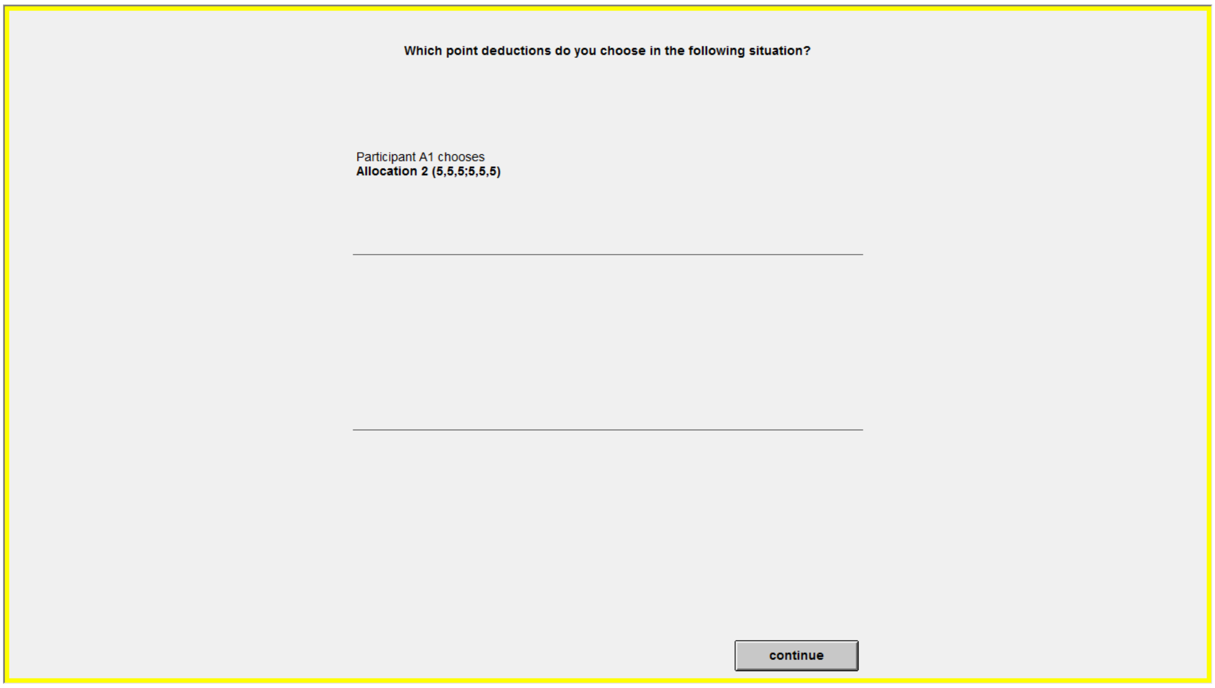
First, you will see the following screen.



If you hit continue, you will observe how participant A1 decided.

[This page appeared only in instructions for participants B]

After you clicked „continue“, you observe how Participant A1 decided.

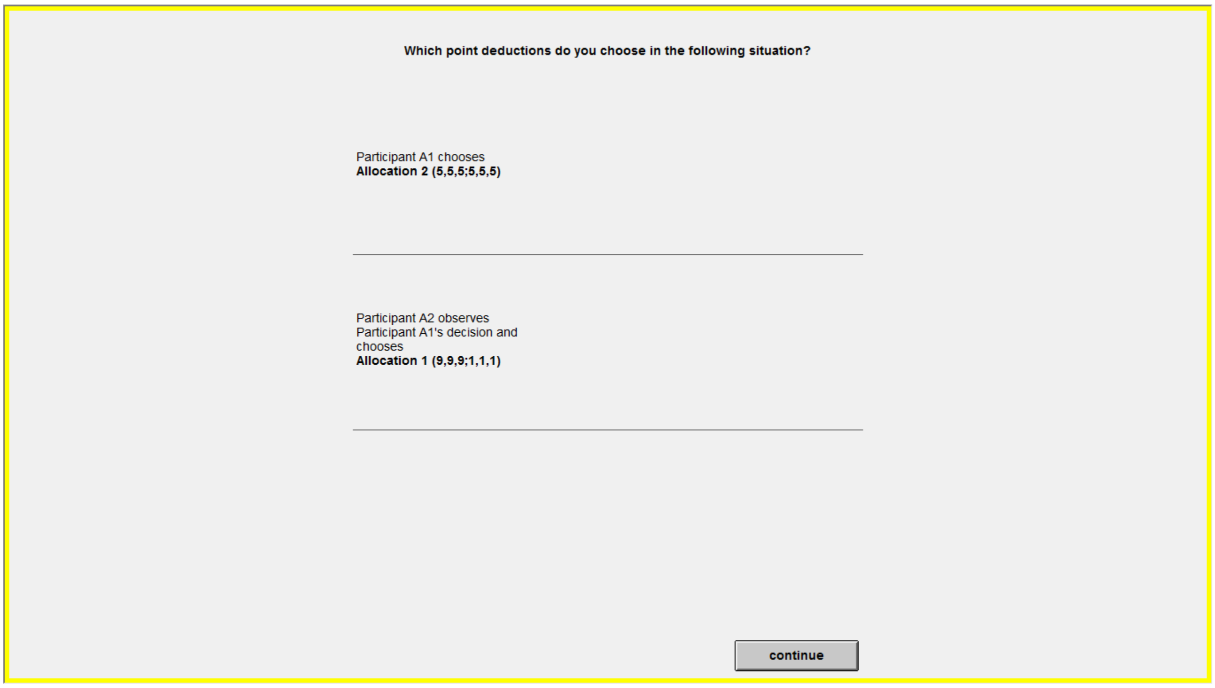


In the example Participant A1 has chosen Allocation 2.

If you hit "continue", you will observe how participant A2 decided.

[This page appeared only in instructions for participants B]

After you clicked „continue“, you observe how Participant A2 decided.

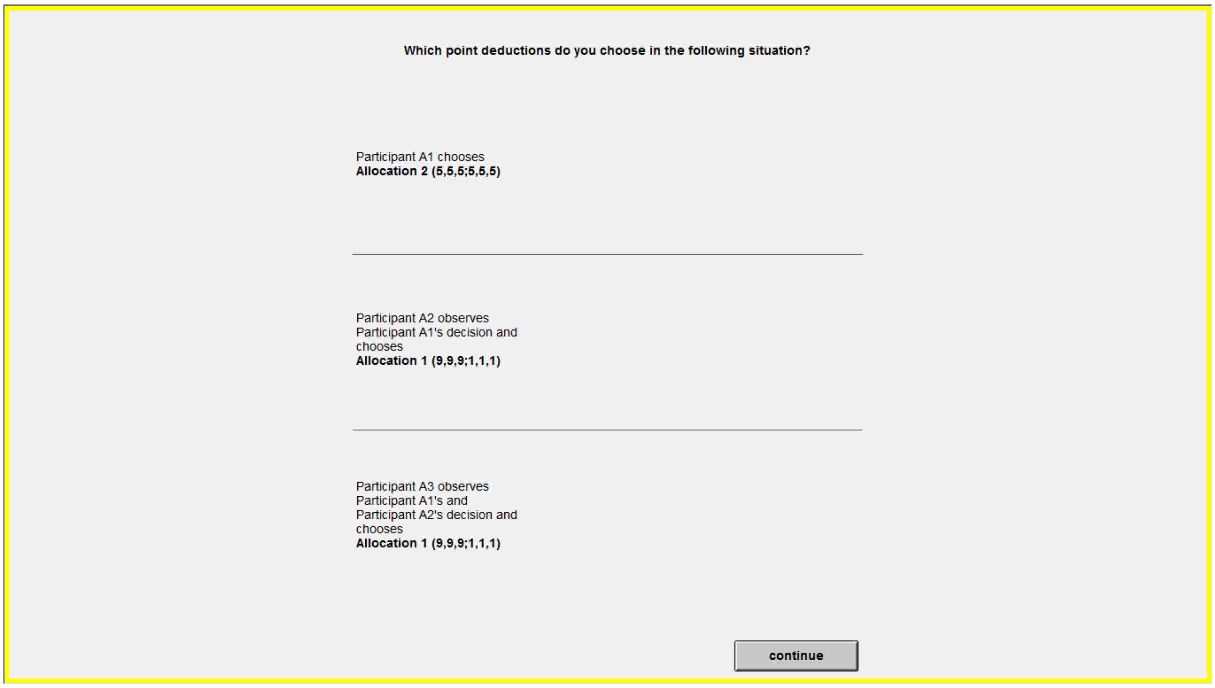


In the example Participant A2 chose Allocation 1 (after Participant A2 observed Participant A1's decision).

If you hit "continue", you will observe how participant A3 decided

[This page appeared only in instructions for participants B]

After you clicked „continue“, you observe how Participant A3 decided.

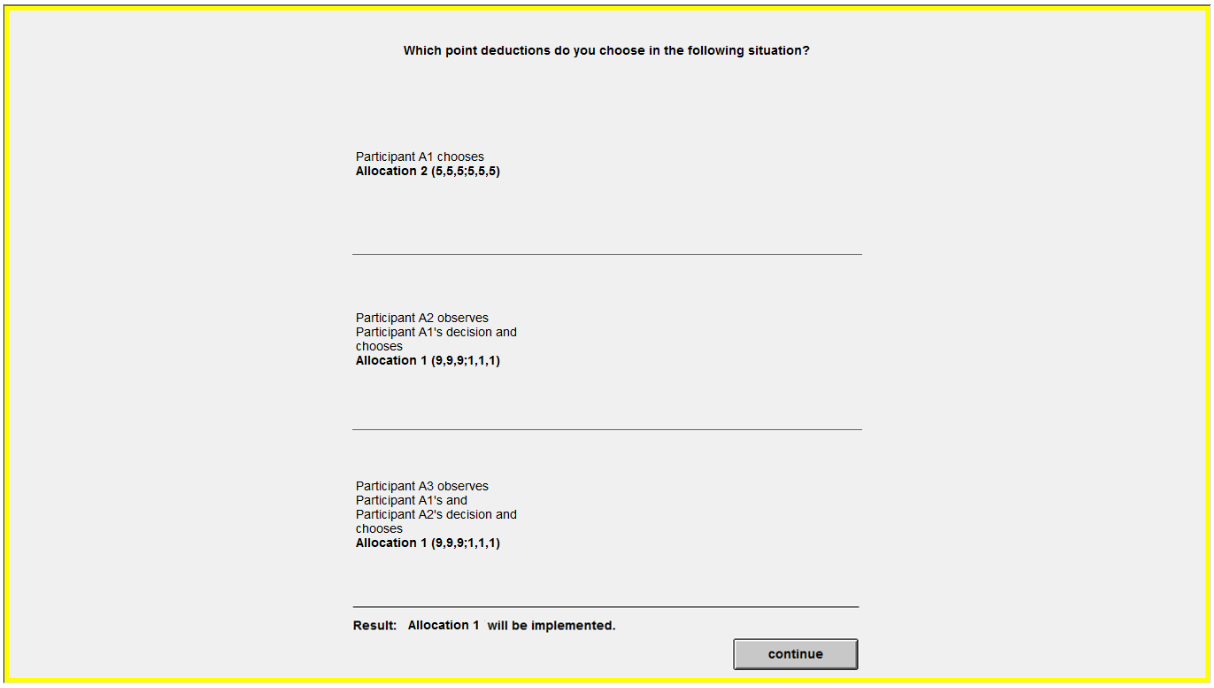


In the example Participant A3 chose Allocation 1 (after Participant A3 observed A1’s and A2’s decision).

If you hit “continue”, you will see which allocation results from participants As’ decisions.

[This page appeared only in instructions for participants B]

After you clicked “continue”, you will see which allocation results from participants As’ decisions.

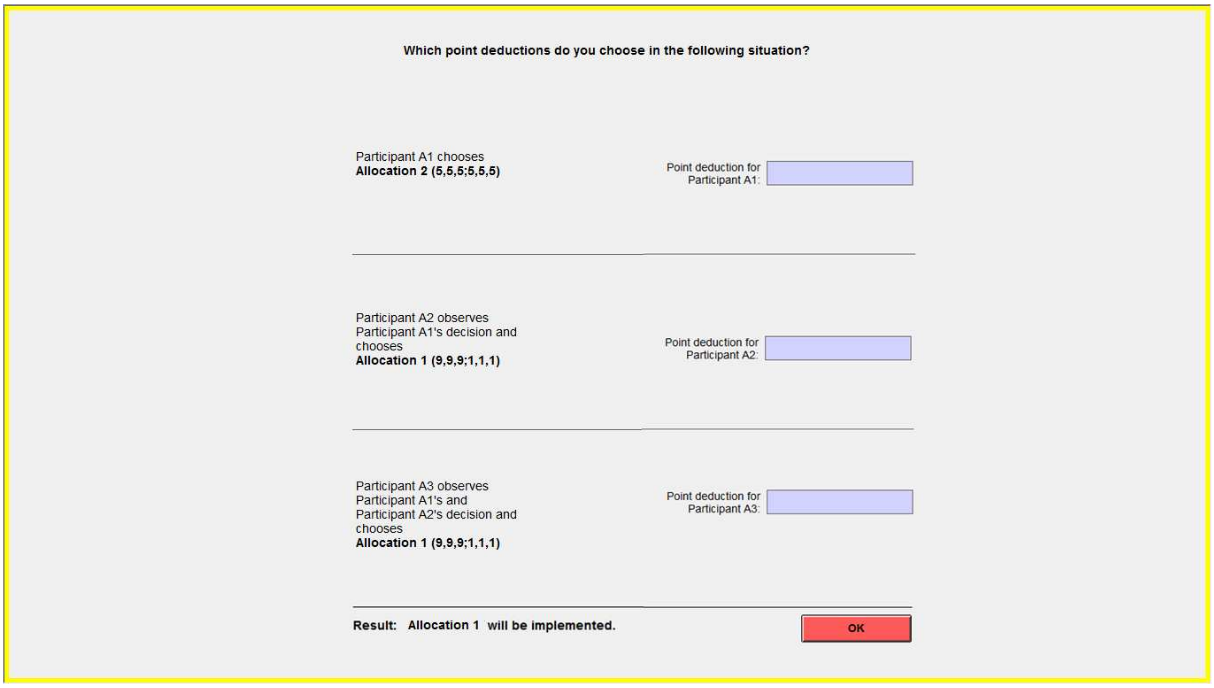


In the example, Allocation 1 is implemented.

If you click “continue”, the fields in which you can enter the number of points you want to deduce will appear.

[This page appeared only in instructions for participants B]

After you clicked “continue”, the following screen appears.



In case you are randomly selected as the participant B who can deduce points from participants A please...
…fill in the number of points you want to deduct from Participant A1 in the upper field,
…fill in the number of points you want to deduct from Participant A2 in the middle filed,
and fill in the number of points you want to deduct from Participant A3 in the lower field.

If you do not want to deduce points from a Participant A, you enter “0” in the respective field(s). If you have made your decisions, click the OK- Button on the lower right. As long as you have not clicked that button you may change your input in the fields.

The screens for the other seven situations are similar to the one situation described in the example. Please note: The eight possible situations are displayed in **random order**! (The sequence thus has not to be as indicated on page 7.) **Thus please be aware for which situation you are deciding!**

Do you have any questions? Please raise your hand and we will come to your cubicle to help you.